# Products Finishing

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*(On leave in U. S. Armed Forces)*

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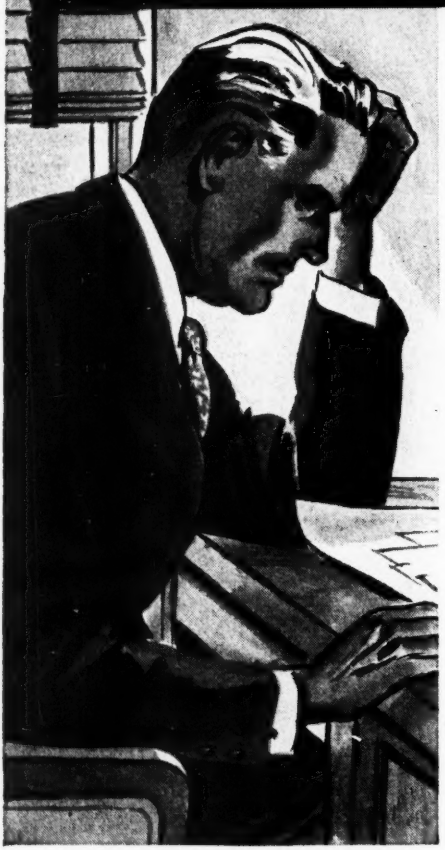
*Here's Egyptian Doing It Again....*

**Enamel, Olive Drab, Rust-Inhibiting**
**U. S. Army Specification *No. 3-181***



Egyptian offers this important "spec" finish with the usual Egyptian "plus" in quality, applicability and appearance.

It is a one-coat paint system over phosphate-treated or solvent-cleaned steel such as Metal Ammunition Containers, Landing Mats, Metal Tool Kits, Metal First Aid Kits, Metal Bins, Tables, Water and Blitz Cans exterior — also Gasoline and Water Drums and other drums and pails.

Comes in three types: I — for dip application; II — for brush and spray application; III — for roller coat application. Can be baked in convection-type oven or infra-red bank.

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EGYPTIAN FINISHES

**EGYPTIAN**
**SUPERIOR FINISHES**

"Looking Toward Tomorrow" is the name chosen by the National Paint, Varnish and Lacquer Association to express the intent of its Postwar Planning Committee. Back of the name is the concerted effort of the paint industry to study the postwar markets and to plan toward tomorrow, and thus establish an accrued valuation in the days when "postwar" is an accomplished fact and its present merit as a term will be gone.

As part of this new program; the Paint Industry will publish reports which it intends to supply to the industry as a guide post to practical planning by the individual manufacturers. These are intended to report the newest developments in the field of finishing from shipbuilding to toy manufacturing. An all embracing service that will tell what other industries are doing and how it will affect the paint industry.

For example, this committee expects to cover and report on new products and new types of surfaces—some of which may require finishes while others will not. "Looking Toward Tomorrow," as the name of the bulletins implies, will tell what's happening among makers and distributors of products—be they made of plastics or bronze—sheet metal or cast iron.

The strategic importance of paint in war production is amply demonstrated by the conspicuous success of the industry in supplying stupendous quantities of protective coatings for war equipment. Today the paint industry carries on with unstinted service by supplying the needs of our armed forces and keeping "Paint Fighting on All Fronts"... The paint industry is both forging onward in war production and planning ahead for postwar acitivities.

☆ ☆ ☆

Although, according to announcement coming from headquarters, the 1944 A.E.S. Convention will provide another program which will be packed with beneficial papers and good speakers, there will still be ample opportunity to have a little fun.

Those who attended last year's Buffalo meeting of the A.E.S. will recall what a rousing session that turned out to be. This year's convention is expected to be equal in every respect. It will provide an opportunity for those who attend to get an unbiased account of many new developments, some radically new in the field of cleaning, plating and polishing.

This year's program will be up to the standards of former years. Better make your reservation now. Your attendance will be time well "invested."

# Metal Finishes at War

By BURR PRICE
National Paint, Varnish and Lacquer Association

SPECIAL finishes for metal in the fantastic number and variety of weapons, munitions and equipment now in use by millions of American fighting men on world battlefronts are proving tremendous factors in the drive for victory, not only through their contribution to the mechanics of war but also because of the part they play in the protection, comfort and well-being of our combat ranks. A lone Marine wipes out a nest of Japs in a faraway jungle . . . a handful of

Nearly ready to be hoisted into place on the deck of a new ship under construction, this mast is given its final coat of paint.
*(O.E.M. photograph)*

sailors on patrol keeps its constant vigil at an Arctic post . . . a Fortress crew does a precision job deep in the heart of Germany . . . a vast naval task force steams ever near to the target Tokio and blasts an enemy installation with an unbelievable weight of metal . . . an army corps inches slowly forward in the rugged mountains of Italy . . . and every operation, if examined in detail, will reveal the efficient functioning of a paint, varnish or lacquer specifically designed for the job in hand to make it tougher, more durable, more adaptable to widely different conditions and sharp changes in weather and climate.

The full story of protective coatings at war has been gathered by the National Paint, Varnish and Lacquer Association for the information of the War Production Board, the Army, Navy and Maritime departments and other government officials. It is a remarkable, dramatic story, what these metal finishes have done—whether it be to protect a precious little food supply in a K-ration can, coat the funny-looking but deadly bazooka, assure the deadly explosiveness of block-busters or maintain the serviceability of a mammoth tank.

It is a remarkable, dramatic story of the wizardry of chemistry, of new products and new uses, of production and material problems overcome, of new speed finishing, of an industry concentrating to meet a challenge, of the will of America to win. It is a story calculated to rouse the pride of all in a real achievement, to stir the imagination of the metal-finishing industry on progress to come in the world of tomorrow.

Primarily achieving a triumph over rust and corrosion, ancient enemies of the metal world, the chemists and production men have pushed on in the face of many obstacles to develop finishes which have contributed enormously to the conservation of metals and to their conversion from one field of use to another and more vital one. For example, research in metal finishes made possible a change-over from brass and copper to steel in the fabrication of shell cases, with consequent enormous savings in those critical metals and, incidentally, an improvement in firing qualities. Furthermore, steel cases can be cleaned, repainted, reloaded and used again and again.

Likewise, development of effective protective coatings for fibre and fibre-and-metal containers has released millions of pounds of tin to other war uses. These substitute containers are capable of carrying everything from dehydrated foods and blood plasma to shells and TNT. Metal edges finished with non-chipping lacquer re-inforce the plasma packages, which are vacuum-sealed cardboard cylinders treated with clear lacquer for grease and moisture resistance. These life-savers are often dropped from planes by parachute without damage.

**Metal Finishes in Battle**

Divide the story of metal finishes at war into three parts, and the magnitude of the job they have done is enhanced. To put the battle end uses first, when the modern American infantryman—still the backbone of attack—goes into the field he is equipped with more than 85 items. Every bit of metal in his accessories is protected against rust and corrosion, from the GI shoe eyelet to his non-glint steel helmet. All military hardware formerly made of brass and maintained by "spit and polish" is now made of plated steel, finished with dull black baked enamel which is unaffected by boiling water, acids, alkalies or other chemicals. The fabrics in his clothing are equally protected against the elements.

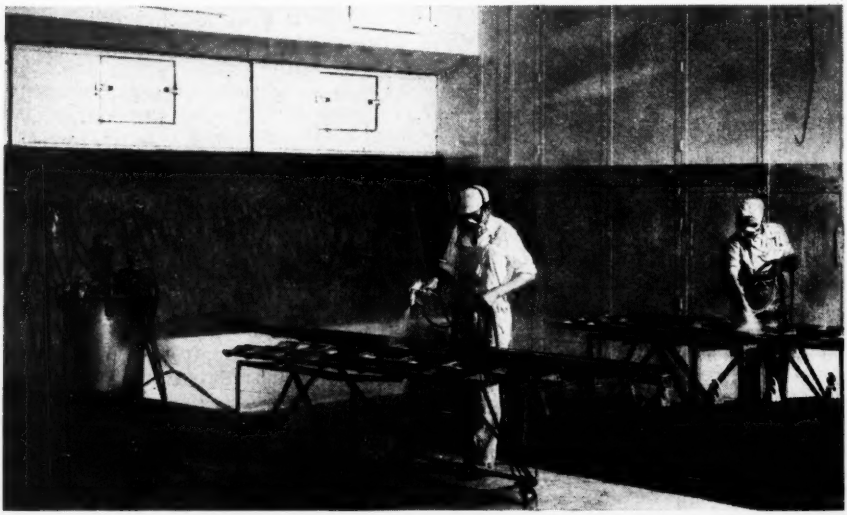
Ground-breaking, road-building and construction machinery are specially painted, as are the field kitchens,

every type of transportation vehicle, water supply systems, lighting units, anti-aircraft searchlights and their mobile power installations.

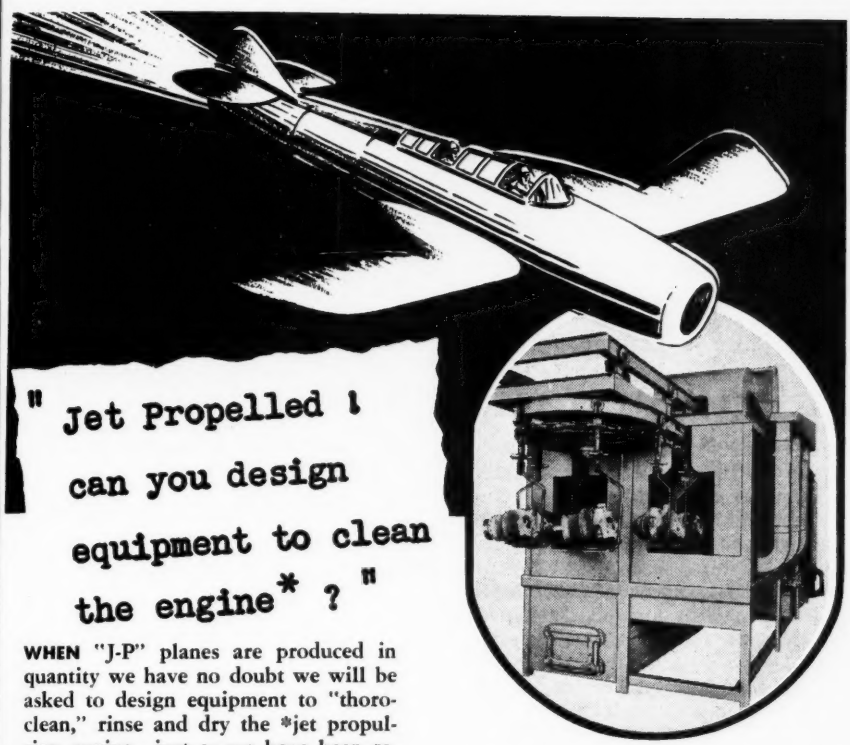
Steel gasoline and water cans on tanks, jeeps and all military vehicles are lined with special synthetic varnishes and enamels to guard against contamination as well as corrosion, and food containers are painted on the outside and coated with an inner protective lining to preserve the contents in the condition in which they were packed.

Actual combat equipment—tanks, planes and every type of ordnance from a machine gun to the giant guns mounted on railroad trucks—needs paint to keep it in fighting condition. Likewise, the shells and cartridges they fire. Steel shell cases are painted on the inside with an acid-resistant material and on the outside with a protective primer. Before they are loaded, all exterior surfaces except the rifling bands are finished with a lacquer enamel to protect the shell against abrasion in handling and oxidation due to exposure. This film must not vary in thickness by more than 0.0001 inch; it must be elastic enough to stand the crimping operation after the projectile is inserted, and it must not soften in the sudden intense heat created by the explosion, otherwise the shell might clog the breach. The inner coatings must be flawless and give absolute protection for the metal against chemical action of the explosive charge.

Protective coatings are equally important on the interior and exterior of grenades, bombs, incendiaries and land mines. The grenade explosive container is made of sheet metal specially galvanized to retain a coating of paint and is finished both inside and out to prevent rust. Protection against exposure to the elements is vital for bombs, which are frequently exposed to all sorts of weather for long periods in ammunition dumps. Bomb coatings must be able to with-



This scene is typical of many industrial plants today where metal sections are sprayed with paint in modern water-wash spray booths.
*(Official U. S. Navy photograph)*



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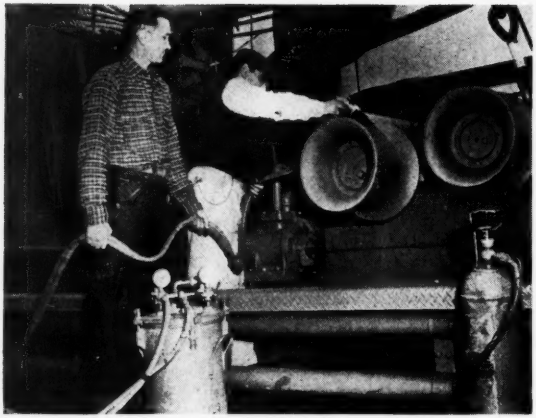

A low pressure M-1 spray unit is used in a spray painting operation on a Liberty ship. *(U. S. Maritime Commission photograph)*

stand immersion for 18 hours in cold water without fading, softening, checking or changing color.

Furthermore, bomb coatings, shell coatings and the exterior of all metal equipment must be kept free of sheen or gloss that might attract the attention of enemy airmen, thus revealing the position of troops or supply bases.

This need for protective concealment of men and materials has been met with a high degree of perfection in the lusterless olive drab enamel that covers the huge bulk of the modern tank—a coating which, while unremarkable to the casual glance, has several unusual features. It has minimum visibility, low specular reflection, scattering the light that impinges on it and thereby eliminating the risk of revealing glints. This low luster is retained throughout the life of the finish.

Beneath the olive drab enamel is a red oxide zinc-chromate primer which provides good adhesion and guards the metal against rust. It will continue to give this protection even though the outer film is damaged by flying fragments, because through ionization it sets up "eddy currents" in the metal which inhibit rust. The tank interiors are painted a brilliant white, not only to protect the surfaces but to give a maximum of light; the ammunition boxes are likewise painted white to make them easily located; and all other parts of the interior of these mammoth land battlewagons are painted to give watertightness and protection against abrasion and friction.

### Paint and Air Power

Just as practically everything that fights on land needs and gets a protective coating, so too does everything that flies in modern war. In the field of airplane finishes, the industry's formulators met perhaps their greatest challenge and evolved specifications which will forever redound to their credit. They had to overcome problems of durability, camouflage, weight, insulation, fire-resistance, reaction to sharp extremes of heat and cold, permeability and de-icing. Ice formation on exposed plane parts has always been a menace to high-altitude flying, both commercial and military, and with the development of three types of de-icing paints a long step forward has been taken in this safety phase of war and post-war aerial operations. One material contains a free-flowing oily liquid that exudes in cold temperatures and prevents adhesion of ice to paint. A second contains water-soluble salts, which dissolve the film of ice as it forms, so that it can be carried off by the slipstream. The third type of coating combines high electrical conduc-

"AN LST HAD TO BE READY WITHIN 96 HOURS"

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PROBLEM: The subject company makes LST (landing ships for tanks). Deck plates are made at a distant plant and, to prevent rusting, are painted with a zinc chromate base in a bakelite or glyceral phthalate vehicle. The shop men had great difficulty in stripping this paint from the plates and the chief chemist called on us because he believed we might have had some experience. It was 11 a.m. Friday when we were called in. *He told us that one of the ships, which still needed deck plates installed, had to be complete for a trial run within 96 hours.*

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METHOD USED: A solution of Pennsalt Cleaner #23 was made up and heated to 212° F. The deck plates were immersed for 15 minutes, rinsed and dried.

RESULTS: At 11 a.m. Sunday (exactly 48 hours after we were called in) enough plates had been stripped for four LST's and all necessary plates were installed in the ship required for test run.

REMARKS: Customer was greatly pleased. Pennsalt Cleaner #23 was the only satisfactory stripper they had tried. They were pleased too because the job saved 48 hours.

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tivity with considerable resistance, and hence can be heated electrically, causing the newly-formed ice to fall off.

Exterior paints for airplanes must not crack or lift in the violent temperature changes which come, for example, when a machine takes off from the blistering heat of the desert and finds itself in a few minutes high up in sub-zero atmosphere; they must withstand pounding of sleet and hail; the corroding impact of salt air and salt spray; the vibrations of the engines; the detonations of the armament. The war paint that covers the aluminum fuselage and wings of a big plane consists generally of a primer of high corrosion resistance, followed by two non-specular olive drab enamel or lacquer coats. Something of the technical finishing hurdles which were taken in their stride may be gathered from the fact that whereas it is the roughness in paint that makes for low luster, airplane exteriors must still be kept absolutely smooth, because a coarse surface can cut down flying speed by from five to ten miles an hour.

With few exceptions, there is scarcely a part on the interior of a bomber or fighter that does not require a paint industry product for protection and smooth-functioning: the engine, the superchargers, the fuel and air pumps, the miles of wires and cables which call for insulation lacquers, the radio, navigation and fire-control instruments; likewise the fighting and life-saving equipment of members of the crew.

A supplementary achievement of the paint industry in aerial activities has been scored in the successful operation of improvised landing fields in faraway places and in the refueling of planes. Sectional landing mats of metal can be transported by truck and quickly laid in difficult country;


**The why of**

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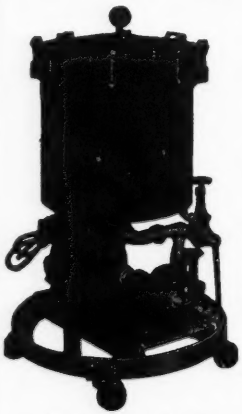

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they are thoroughly painted not only to protect them from rust but to give them necessary concealment. Likewise, the portable pipe lines for precious 100-octane gas are painted both inside and out.

**Marine Painting Is Never Finished**

Expansion of the United States Navy and of our merchant marine when fully revealed after the war will, without doubt, stand as one of the miracle production achievements of all time, and, accordingly, the use of protective and concealment coatings has been on a stupendous scale. Paint in vast quantities is required not alone for the fighting ships and their auxiliaries, but for yards, docks, shore installations and equipment. It is estimated that the warships alone consume 50,000 carloads of paint annually; a battleship of the Iowa class requires 400,000 pounds, enough to cover 7,200,000 square feet of surface. And, everywhere, protective repainting is a continuous operation.

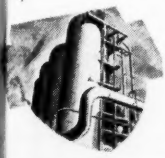
Naval paint is dominantly for protection and concealment. Not a square inch of paintable surface, inside or out, topside or bottom, goes without its special covering to safeguard it against the ravages of wind, weather, salt water, marine growths —and battle. Paint used on naval and merchant marine vessels may be roughly divided into primers, bottom paints, topside exteriors, interior finishes, putties, sealers, fillers and compounds. The actual job on a warship falls into two divisions—that below the waterline and that above it. Both sections, generally speaking, require four coats: the after pickling coat, applied following the acid bath to remove mill scale; the primer, an inhibitive coating containing zinc chromate; a coat of anti-corrosive paint; and one reddish-brown anti-fouling coat, which is de-

The workmen shown here are stacking 500-pound demolition bombs which will be shipped to an Ordnance Department loading plant. Bombs such as these must be carefully treated before exposure to the elements.

*(Official Signal Corps photograph)*

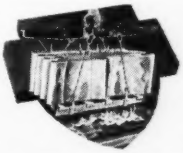
# GENERAL CHEMICAL

## AGAIN GENERAL CHEMICAL CREATES NEW FACILITIES FOR SULFURIC ACID TO SERVE AMERICAN INDUSTRY



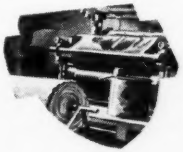
**Petroleum**
Alkylation, sulfonation, and improving color, odor, and stability of petroleum products.

**Rayon**
Used in the spinning bath in rayon manufacture.

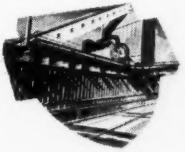


**Steel**
For pickling of steel sheets and castings; removes oxides and scales.

**Paints**
Raw material in production of pigments; for sulfonating drying oils.



**Sulfonation**
Sulfonating vegetable oils for water, fire, and mildew-proofing fabrics and textiles.



**Coke By-Products**
For washing toluene and benzene, raw materials for dyestuffs and explosives.

**Fertilizers**
Used in super phosphate and ammonium sulfate production.

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signed to protect against barnacles and marine growths that slow up speed.

Topside exterior paints also become camouflage in war-time. Interior finishes comprise fire-retardent coats on decks, bulkheads and furniture. For combat duty, ships use only thin coats of interior paints in order to reduce fire hazards and eliminate excess weight. Naval guns, torpedoes, depth charges, mines, floats and buoys also depend on paint for protection and functioning.

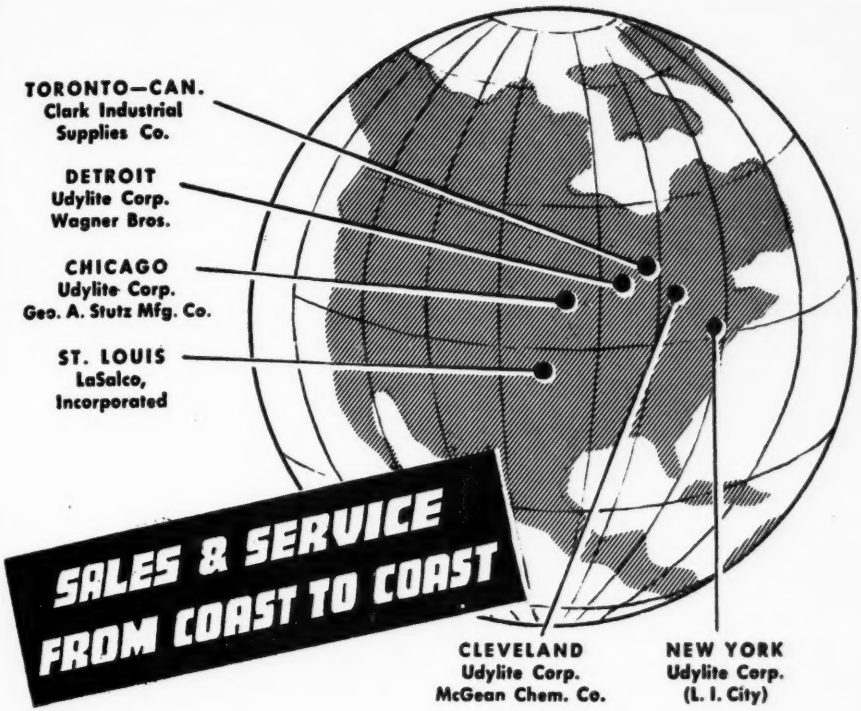
### On the Home Front

Behind the fighting front is the great American production machine, in the smooth running of which paint has also played its vital role; industrial equipment, factory installations, the farflung transportation and communications systems—all have had to function at a speed and with the smoothness essential to the overall war effort. Without them the global war planning of the United Nations would have been futile. The maintenance of industrial equipment which was in existence at the beginning of the war and of the subsequent billions of dollars in installations, the constant battle against the action of fumes, gases, acids, and so on, have been made possible by the efficiency of specialized finishes.

On the manpower side, too, paint is rendering invaluable assistance in keeping production at a peak through increase of output, lessening of eye and bodily fatigue, decrease in accidents, improvement in worker morale.

### Manufacture and Supply

In evaluating the contribution of the paint, varnish and lacquer industry to the war effort, briefly sketched above, it is important to remember that it has had to keep pace with the record-smashing production in all other lines—in factories, arsenals, air-

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| Udylite Corp. (L. I. City) | Udylite Corp. Wagner Bros. | Udylite Corp. Geo. A. Stutz Mfg. Co. | Udylite Corp. McGean Chem. Co. | LaSalco, Incorporated | Clark Industrial Supplies Co. |

craft plants and shipyards. The avalanche of war goods necessitated the development of new concepts of paint application and speed. This is the second phase of the story, and it deals with new high-speed automatic and manual devices for the streamlining of finishing operations. Motor-agitated dip-tanks, belt-type conveyors with reciprocating spray guns, overhead monorail conveyors traveling through color booths, infrared drying lamps and similar apparatus have clipped minutes and hours off production schedules, and at the same time have helped to conserve vital materials, manpower and health. Up to 3,000 shell or incendiary bomb cases an hour have been coated by a single machine; 500 large cartridge clips have been finished in a minute; a complete bomber fuselage has been rolled into gigantic sectionalized spray booths and received priming and finishing coats in assembly line fashion; tanks have been painted, dried and rolled out ready for use in four minutes.

**New Materials and Methods**

Production of the metal and other finishes for war use described above and achievement of the speedy application records would not have been possible had it not been for the "know how" of the paint industry chemists and technical men, and their research into new synthetic resins and oils, new pigments and solvents. Faced with actual shortages of materials, curtailments and restrictions of natural and synthetic products, they have had recourse to new formulations, to new processes—evolved under the stress or military demand—and produced finishes which are establishing records of durability, flexibility and adaptability.

In World War I, the paint industry was called up to produce what then was considered large quantities of specialized finishes, including camouflage paints, marine paints, industrial coatings, baking japans, varnishes and miscellaneous items. The pigments and oils were limited in number. In World War II, we have an enormously different, more difficult situation to meet, bringing into play a far greater use of synthetic resins, new types of chemical solvents and chemical plasticizers. In meeting this situation, the protective coatings industry has had the assistance of the chemical industry, without which the job could not have been done.

What has been done, however, has not only contributed to the war effort, but it also holds enormous promise in the way of postwar improvements in the qualities of finishes for metal products. The advances which have been made in war-time in quickness of drying, durability and adaptability will contribute definitely to the processing of the countless number of civilian products which will come on the market after hostilities have ceased.

## Electropolishing German Silver

THE value of glycerine as a component of electropolishing solutions is brought to the fore in a patent (U. S. 2,315,695) granted to C. L. Faust. According to the patent, which covers a method for electropolishing German silver, or iron or nickel or their alloys, a process is employed which involves passing an electric current from the metal or alloy to be polished, as the anode, through a solution containing about 30-50 per cent of sulfuric acid, about 33-40 per cent of glycerine, and water.

# IMPROVES CLEANING... *Cuts Rejects*

## SUN SPIRITS

### Eliminates Rust . . . Cleans Castings Thoroughly

With speed so essential to our war program, delays cannot be risked in any plant. For every hold-up on the production line takes a drastic toll on vital man-power and time.

**Trouble from rusting** was a major problem in one plant and occurred in the cleaning of castings after machining. The operation was a difficult one at the start.

**Sun mineral spirits** were used, at the recommendation of a Sun Doctor of Industry. The cleaning was satisfactory in every respect . . . rusting has been checked . . . parts are cleaned thoroughly and quickly.

**Rejects have been reduced, drastically,** and their production increased due to the saving of material, man-power and time.

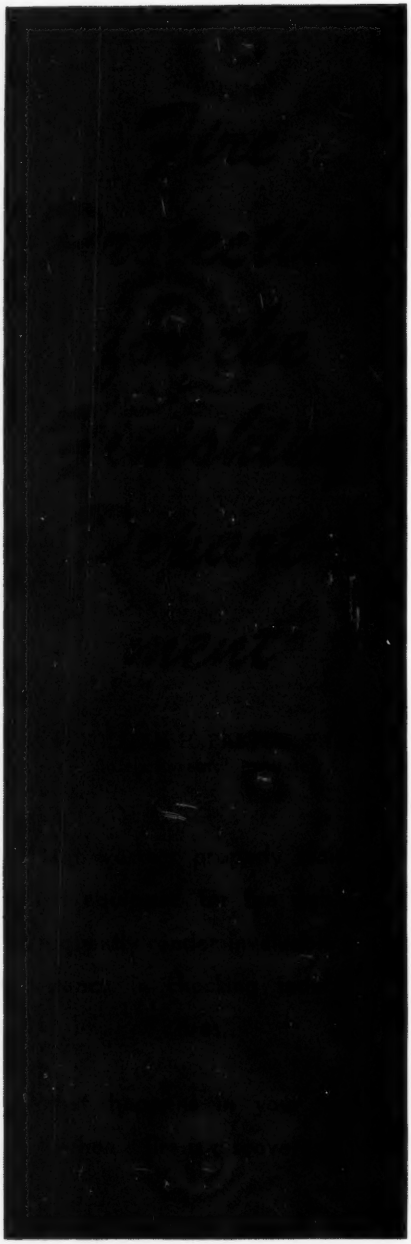
Sun Spirits has proved itself time and again in meeting the needs for the majority of cleaning jobs in any plant. It's fast, thorough, economical and safe, having the approval of the Fire Underwriters at 100° F. flash.

For more detailed information, write for your free copy of "Case Histories of Cleaning Up War Parts."

**SUN OIL COMPANY** · **Philadelphia 3, Pa.**

Sponsors of the Sunoco News Voice of the Air — Lowell Thomas

**SUN INDUSTRIAL PRODUCTS** HELPING INDUSTRY HELP AMERICA



FIRE breaking out in the finishing department, where considerable quantities of flammable liquids are usually present, must be dealt with quickly and effectively to prevent heavy losses.

To this end, the most serious fire hazards associated with finishing, such as dip tanks, spray booths, agitators, and so on, are often protected by means of built-in fire-extinguishing systems, which snuff out any blazes that may start within their radius of action with a deluge of carbon dioxide, foam or water. However, dangeous fires may occur outside these safeguarded areas also. Other lines of fire defense are, therefore, essential for the adequate protection of every finishing department.

One important defense is the municipal fire department; and, as delayed alarms may have disastrous consequences, it should be the invariable rule to summon the fire department the moment any fire breaks out.

However, no matter how quickly the firemen may move, they cannot arrive before an uncontrolled fire in highly combustible materials will have had time to cause damage, perhaps thousands of dollars' worth. To prevent such losses, another line of defense is needed.

This first line of fire defense should consist of workers properly trained and equipped for small fire fighting, for experience shows that instant action by trained personnel on the spot will extinguish most incipient fires with trivial losses and will hold others in check until help arrives.

Progressive industries in all lines have adopted the departmental fire brigade system and, in conjunction with other forms of protection, it is especially suited to extra-hazardous working areas, such as finishing departments.

To organize a departmental fire brigade, two things are necessary:

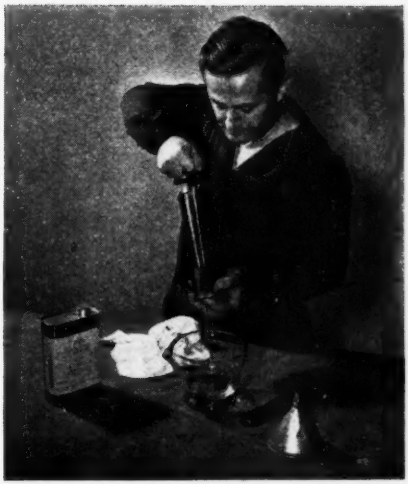
1. An ample supply of the right types of fire-extinguishing equipment;
2. A course of training for the workers.

### Fire Extinguishers for the Finishing Department

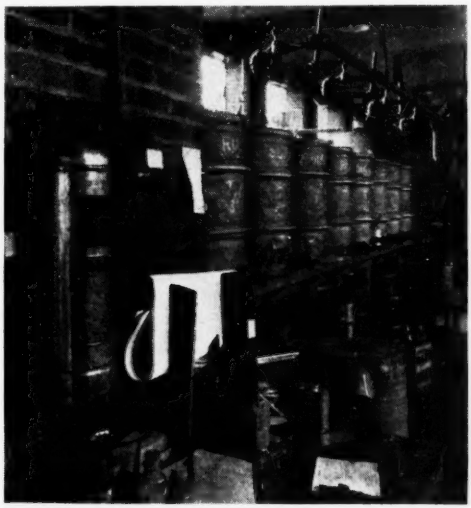
Because several different classes of fire may occur in the finishing department, several different types of hand fire extinguishers in addition to hose and built-in systems, are required for its protection. The principal types that have been approved for use on the following classes of fire are given in the accompanying table. (See page 40)

"E. A. S." Extinguishers — The foregoing "standard" extinguishers are available only to those holding high priorities in these war times. Hence, plants possessing any should take special care to keep them in good condition and distribute them to the best advantage.

For those who need additional equipment but are unable to obtain standard types, a line of "E.A.S." pump-tank and foam extinguishers is being produced. These extinguishers are approved by the Underwriters' and the Factory Mutual Laboratories under Emergency Alternate Specifications. They are constructed largely of non-critical materials and, while they can be depended upon to perform properly, long life should not be expected of them. They should be replaced with standard apparatus when the latter can once more be obtained, as the emergency approval will be withdrawn.



Maintenance of equipment is an important part of fire protection. All extinguishers should be inspected regularly and some types must be recharged annually. The pump action of the vaporizing liquid type, shown here, should be tested annually, even though the extinguisher requires recharging only after use.



Fire extinguishers should be located within easy reach and should be of types suitable for the hazard they will protect. Here a foam extinguisher protects flammable liquids in storage.

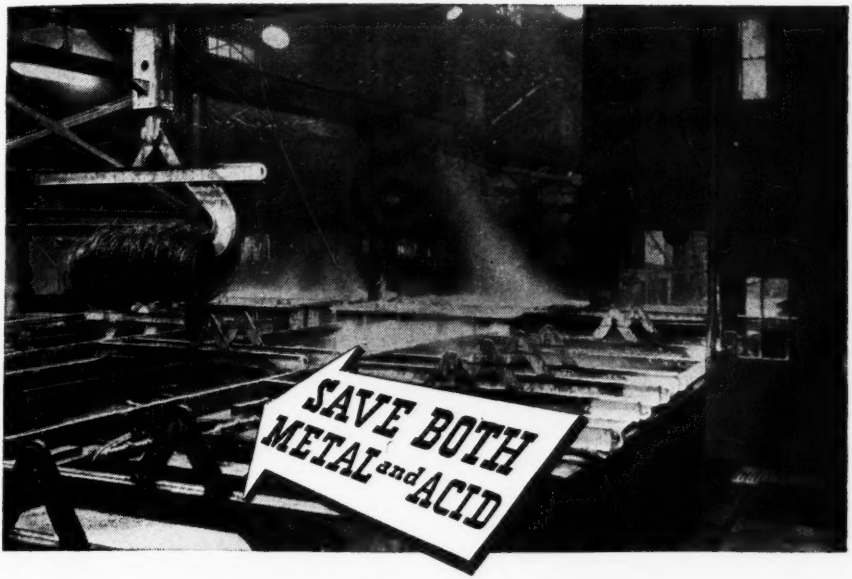
### Placement of Extinguishers

Extinguishers should be mounted near each hazard they are intended to protect, where they are easily accessible and will not be cut off by fire in the hazard. Enough should

| Type of Extinguisher | Contents | To Release Discharge | Protection Required Against Freezing | Recharge | APPROVED FOR USE ON | | |
|---|---|---|---|---|---|---|---|
| | | | | | Class A Fires* (wood, paper, cloth, and so on) | Class B Fires* (lacquer, paint oils and other flammable liquids) | Class C Fires* (live electrical equipment) |
| Soda Acid | Water and chemicals | Turn over | Yes - **never** add anti-freeze chemicals | Annually | Yes (cooling) | No | No |
| Foam | Water and chemicals | Turn over | Yes - **never** add anti-freeze chemicals | Annually | Yes (cooling and smothering) | Yes (smothering) | No |
| Gas Cartridge | Plain water and $CO_2$ cartridge | Turn over and bump on ground | Yes - anti-freeze chemicals may be added to water | After use | Yes (cooling) | No | No |
| Loaded Stream | Water, chemicals, and $CO_2$ cartridge | Turn over and bump on ground | No - (may be exposed to -40 deg. F.) | After use | Yes (cooling) | Yes (action not fully understood) | No |
| Vaporizing Liquid | Specially processed carbon tetra-chloride | Hand pump for smaller sizes; turn valve for larger sizes | No - (may be exposed to -50 deg. F.) | After use | X | Yes (smothering) | Yes (non-conductor of electricity) |
| Carbon Dioxide | Carbon dioxide under pressure | Turn valve | No | After use | X | Yes (smothering) | Yes (non-conductor of electricity) |

* Approving bodies: Underwriters' Laboratories, Factory Mutual Laboratories.
X Not approved for fires of this class, but useful on surface fires where there are no strong air currents to dissipate the vapors.

X Not approved for fires of this class, but useful on surface fires where there are no strong air currents to dissipate the vapors.




**Needless waste of critical materials is inexcusable in the present war emergency when scarcities exist in essential supplies and in manpower to produce them.**

### Rodine

not only prevents overpickling, minimizes acid embrittlement and saves both acid and metal but it makes possible increased production.

The inhibiting principle of Rodine, which confines the action of the acid in the pickle bath to the removal of scale and rust from iron steel and steel alloys, is generally recognized but it is not so well understood that there are many types.

### Types of Rodine

Despite the wide range of steel alloys, the use of sulphuric or muriatic acids or combinations of these in varying strengths, there are grades of Rodine adapted to all pickling requirements.

ACP engineers will gladly recommend the type of Rodine for your particular use. They will also cooperate in the solution of any problems concerning cleaning or finishing of metal. Time will be saved if you will furnish as complete details as possible concerning your methods and problems.

*Manufacturers of Inhibitors & Metal Working Chemicals*

**AMERICAN CHEMICAL PAINT CO.**

**AMBLER ACP PENNA.**

**Note—West Coast Plants may address inquiries and orders for prompt delivery to Leon Finch, Ltd., 728 East 59th St., Los Angeles, California**

**AMERICAN CHEMICAL PAINT COMPANY, AMBLER, PA.**

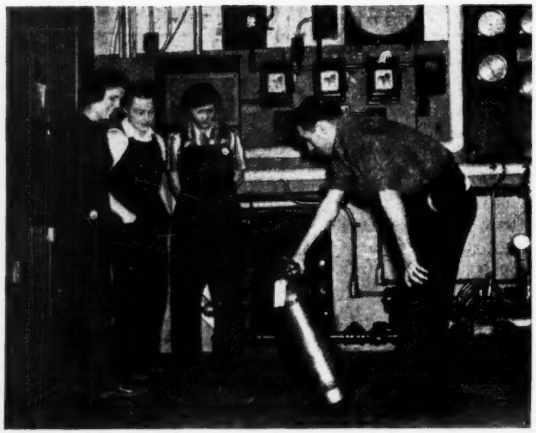
*Please send me general Technical Service Data Sheets on*

Name_____ Title_____ ☐ *Rodine*

Company_____ ☐ *Pickle Bath Toner*

Address_____

A-5



In many industrial establishments, women as well as men are included in the plant and departmental fire brigades. *(Courtesy Factory Mutual Laboratories)*

be provided so that two or more of the right types can be brought in less than a minute to any point within the area to be protected.

**Training Workers in Fire Protection**

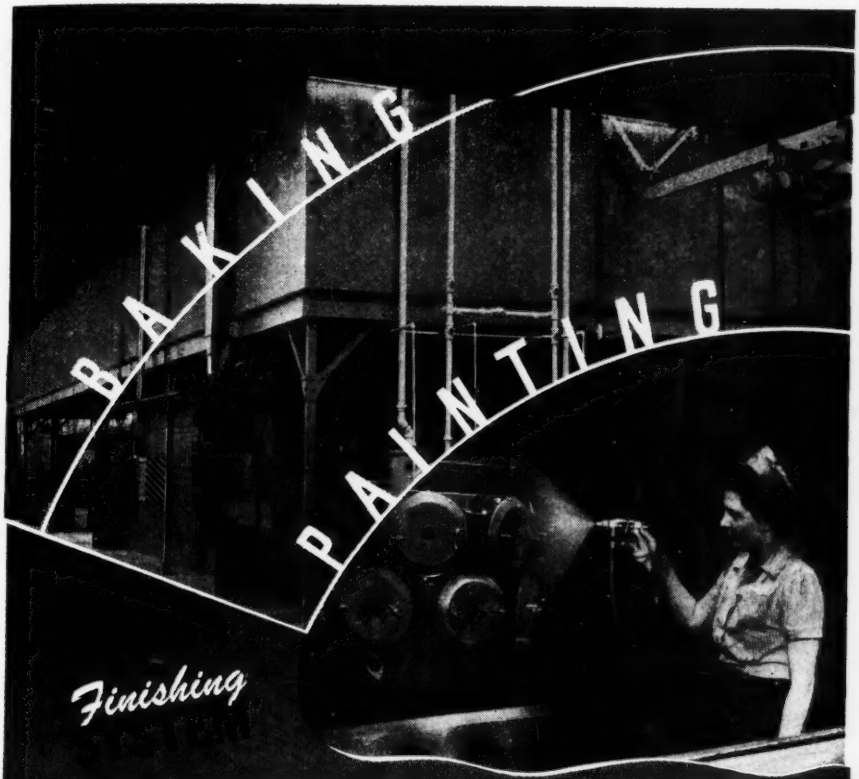
To ensure the most effective action in event of fire in the finishing department, every able-bodied man in the department should be trained in fire-fighting, with the foreman, or superintendent, acting as fire brigade captain. The brigade captain, in turn, acts under the direction of the plant fire chief, or the local municipal fire chief, if there is no overall plant fire protection organization.

By means of periodic fire drills, the workers are trained in the following emergency duties:

1. Turning in a fire alarm to summon the plant fire brigade, if there is one, or the municipal fire department;
2. Ensuring the safety of those not needed for fire duties;
3. Fighting the fire;
4. Turning off power, closing fire doors, standing by sprinkler shut-off valves, and performing other operations required by circumstances;
5. Protecting endangered equipment and supplies from fire and water damage.

This training should, if possible, be

It is important to instruct workers who will have the responsibility of fire fighting in the proper use of the different types of extinguishers. *(Courtesy Caterpillar Tractor Co.)*

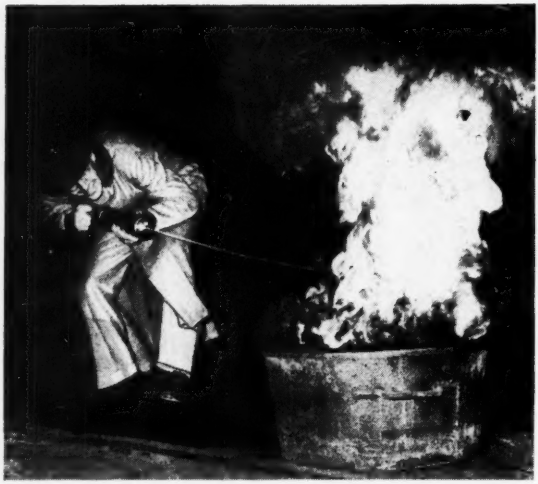



**SPECIALLY DEVELOPED to expedite the painting and baking of AIRCRAFT ENGINE CRANKCASES**

*In this newest aircraft engine plant Mahon engineering has effected remarkable economies. By overhead conveyor, crankcases now flow continuously past painting positions and through the automatically regulated 4-compartment baking oven. Locating the oven ten feet above floor level saves valuable floor space. A specially developed ventilating system feeds and exhausts from the paint room 70,000 cubic feet of heated, filtered air per minute, protecting operators' health and insuring faster, better work. . . . Mahon engineers can modernize and economize YOUR finishing operations with equal efficiency and despatch.*

THE R. C. MAHON COMPANY
DETROIT 11 CHICAGO 4

*Manufacturers of Metal Cleaning Machines • Rust Proofing Machines • Hydro-Filter Spray Booths • Ovens of All Types • Filtered Air Supply Units • Hydro-Foam Dust Collectors—and Many Other Units of Special Production Equipment—including Complete Finishing Systems*



In fighting a flammable liquid fire, the operator should play the extinguisher stream against the far inside wall of the container just above the burning surface. *(Courtesy Underwriters' Laboratories, Inc.)*

directed by someone with experience in industrial fire protection, but an effective course can be worked out by inexperienced persons with the aid of the comprehensive "Training Manual for Industrial Fire Brigades," published by the National Fire Protection Association, 60 Batterymarch Street, Boston, Massachusetts.

### Fire Prevention

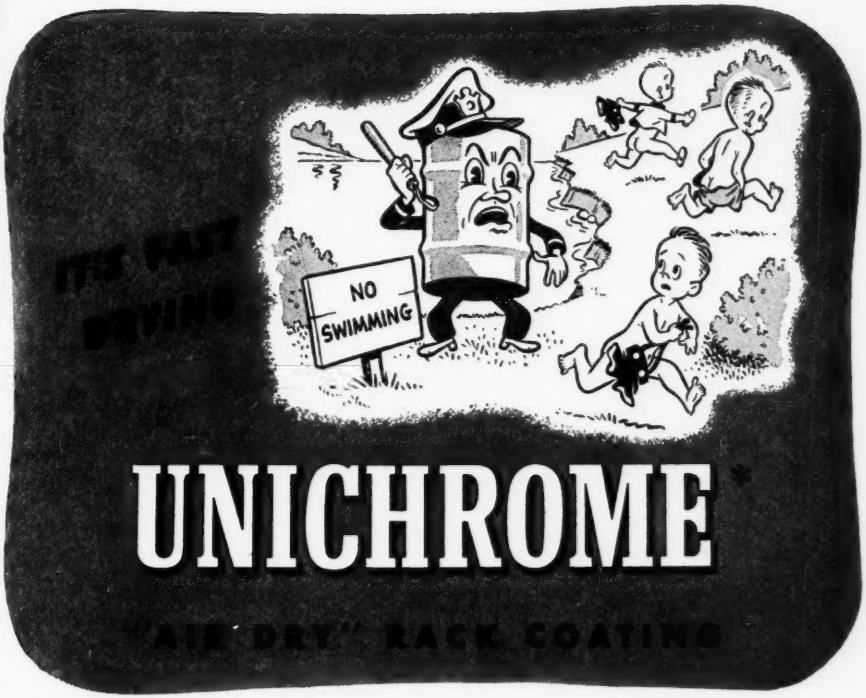
In addition to fire protection, the workers' training course should also cover the measures necessary to prevent fires in areas where flammable liquids are being used, chief among which are:

1. The maintenance of the highest standards of housekeeping, with absolute cleanliness everywhere.
2. The safe disposal of all rubbish, including, especially, lacquer and paint residues, and oily and paint-soaked rags and garments.
3. The elimination of fires, flames, and sources of sparks from the department, with the absolute prohibition of smoking.
4. The installation of all electrical equipment in accordance with the requirements of the National Electric Code for hazardous locations.
5. The electrical grounding of all equipment for handling flammable liquids, including funnels and portable containers when the latter are being filled or emptied.
6. The provision of ample ventilation (natural, if possible) to keep the concentration of flammable vapors far below the lower explosive limits, especially in low points, such as shafts, pits, basements, and similar locations.

---

**Fulscope Pneumatic Set Controller.** A descriptive bulletin, No. 98159, on the Fulscope Pneumatic Set Controller has been issued by the Taylor Instrument Companies, Rochester, N. Y. It covers both the uses and the operating principles of the instrument.

In applications where a temperature, a pressure, a rate of flow, or a liquid level must automatically conform to changes in another variable related to the same process, the pneumatic set offers a versatile, highly responsive control which reduces the adverse effects of time lag and load change. Pneumatic set is available in either single duty recording or indicating forms, single or double record, single or double indication. Bulletin 98159 is liberally illustrated with photographs and simplified application drawings. Copy free upon request.




# UNICHROME*

"AIR DRY" RACK COATING

## *For every cycle where you want an air-dry insulation*

PLATERS EVERYWHERE find Unichrome Air Dry Rack Coating *easy to apply, but hard to wear off* —because it holds its own in all types of plating solutions—going through 500 and even 1000 cycles without a sign of damage.

New and improved synthetic resins are the answer. And though these special resins and fast-drying solvents are closely restricted today, we haven't changed the formula one iota. You still get *maximum* protection with a *minimum* of re-coating cost when you specify Unichrome "Air Dry" Rack Coating. Better write for a trial order today. Address request for prices or an initial order to nearest office.

* Reg. U. S. Pat. Off.

**PROPERTIES**

**Chemical Resistance**—Excellent for all plating cycles.

**Toughness**—Withstands repeated flexing and shop handling—cuts cleanly and easily at contacts.

**Drying**—Dipped and dried at room temperature in container in which it is shipped.

**Adherence**—Excellent for all except the severest cycles—in which case Coating 202 is recommended.

**UNITED CHROMIUM, INCORPORATED**

**51 East 42nd St., New York 17, N. Y. • 2751 E. Jefferson Ave., Detroit 7, Mich. • Waterbury 90, Conn.**

**Unichrome Coating 202**—a new rack insulation, similar to "Air Dry" but which is force dried to obtain the extra adherence required in anodizing and hot, strongly alkaline solutions.

**Unichrome Quick Dry Stop-Off 322**—for cyanide copper and other plating work requiring an extremely adherent stop-off.

**Unichrome Quick Dry Stop-Off 323**—for chromium and other plating work requiring a stop-off that can be peeled off after use.

**Unichrome Resist**—a solid insulating material for constructing composite racks, stop-off shields, insulating gaskets, etc.

# Classification of Pigments

By JEFFREY R. STEWART

## Part 2

THE importance of the particle size of pigments was discussed in the first section of this article, which was published in the April issue of PRODUCTS FINISHING. Since a discussion of this subject is not only very interesting, but also instructive in some of our problems, some further comments are appropriate at this time.

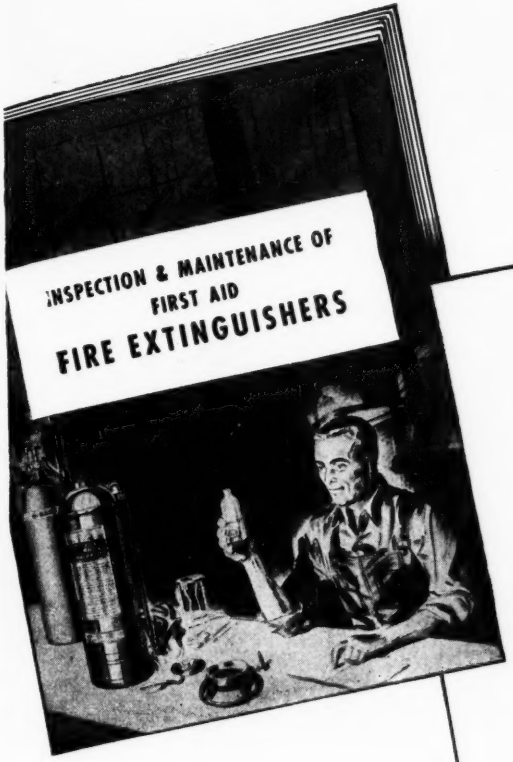
For instance, the question might be asked, "Just how small is a pigment particle which passes through a 325-mesh screen?" The best way to explain this is to compare it with other commonly discussed particles, such as bacteria, red blood cells, cosmic rays, the diameter of the human hair, and so on. In order that a relative comparison can be made which will give some idea of the size of a single pigment particle, the following table is presented.

### Table of Relative Sizes

An examination of this table provides a fairly good conception of the size of the particles with which we are dealing. When considering pigment particles which are finer than 325 mesh, it is necessary to transfer from the practical condition to the theoretical stage. This condition exists because it is difficult, from a practical standpoint, to manufacture a screen that will be finer than 325 mesh.

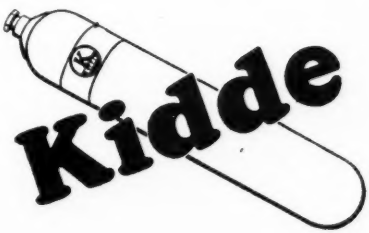
**Table of Relative Sizes**

| *Material* | *Approximate Size Limit* | *In A Units* |
|---|---|---|
| Proton | $2x10^{-6}\mu\mu$ | 0.00000002 |
| Electron | $38x10^{-4}\mu\mu$ | 0.000038 |
| Cosmic Ray | $5x10^{-2}\mu\mu$ | 0.0005 |
| Shortest X-Rays | $6\ \mu\mu$ | 0.06 |
| Diameter of Hydrogen Atom | 1.08 A | 1.08 |
| Longest X-Rays | $8\ m\mu$ | 80 |
| Colloidal Particles | 2-100 $m\mu$ | 20-1000 |
| Lower Limit of the Microscope | $100\ m\mu$ | 1,000 |
| Wave Length of Violet Light | $400\ m\mu$ | 4,000 |
| Wave Length of Red Light | $650\ m\mu$ | 6,500 |
| Bacteria (cocci) | $2\ \mu$ | 20,000 |
| Red Blood Cells | $8\ \mu$ | 80,000 |
| White Blood Cells | $25\ \mu$ | 250,000 |
| Lower Limit of Visibility (naked eye) | $40\ \mu$ | 400,000 |
| 325 Mesh Opening | $44\ \mu$ | 440,000 |
| Diameter of Human Hair | $50\ \mu$ | 500,000 |
| 100 Mesh Opening | $149\ \mu$ | 1,490,000 |




**PARTIAL LIST OF CHAPTERS**

Who's In Charge?
•
Keeping Records
•
What Kind of Extinguishers?
•
Marking Locations
•
Marking the Extinguishers
•
Inspection of Extinguishers
•
Vaporizing Liquid Extinguishers
•
Carbon Dioxide Extinguishers
•
Soda-Acid Extinguishers
•
Foam Extinguishers




**545 MAIN STREET, BELLEVILLE, N. J.**

In this respect the following table should be of interest because it shows the theoretical particle sizes from 325 mesh all the way up to 12,500 mesh. The industrial finishing expert who keeps a record of compilation of such useful reference material may wish to clip this information for use in his files. It serves as useful correlative data.

pigments. The table on page 52 represents the consumption figures for various types of pigments during a decade which would be representative of peacetime activity.

### Tinting Strength and Hiding Power

Possibly the reader will recall that tinting strength and hiding power of

**Comparison Between Sieve Series and Particle Size of Pigments**

| *Meshes per Linear Inch* | *U. S. Sieve No.* | *Opening In Inches* | *Opening in Millimeters Micron=.001 mm.* | *Wire Diameter in Inches* | *Wire Diameter in Millimeters* |
|---|---|---|---|---|---|
| 27.62 | 30 | .0232 | .590 | .0130 | .330 |
| 32.15 | 35 | .0197 | .500 | .0114 | .290 |
| 38.02 | 40 | .0165 | .420 | .0098 | .250 |
| 44.44 | 45 | .0138 | .350 | .0087 | .220 |
| 52.36 | 50 | .0117 | .297 | .0074 | .188 |
| 61.93 | 60 | .0098 | .250 | .0064 | .162 |
| 72.46 | 70 | .0083 | .210 | .0055 | .140 |
| 85.47 | 80 | .0070 | .177 | .0047 | .119 |
| 101.01 | 100 | .0059 | .149 | .0040 | .102 |
| 120.48 | 120 | .0049 | .125 | .0034 | .086 |
| 142.86 | 140 | .0041 | .105 | .0029 | .074 |
| 166.67 | 170 | .0035 | .088 | .0025 | .063 |
| 200.00 | 200 | .0029 | .074 | .0021 | .053 |
| 238.10 | 230 | .0024 | .062 | .0018 | .046 |
| 270.26 | 270 | .0021 | .053 | .0016 | .041 |
| 323.00 | 325 | .0017 | .044 | .0014 | .036 |

The following are the approximate theoretical meshes with millimeter and micron equivalents. These are frequently referred to as micronized pigment sizes.

| *Theoretical Mesh Size* | *Particle Size* |
|---|---|
| 625 | .020 or 20 microns |
| 1250 | .010 or 10 microns |
| 2500 | .005 or 5 microns |
| 5000 | .0025 or 2½ microns |
| 12500 | .001 or 1 micron |

### Consumption of Pigments

The writer has enlisted the cooperation of the U. S. Department of Commerce in Washington, D. C., whenever statistical data is required relative to production and consumption figures. Private statistical bureaus rarely go into the study of such relatively specialized materials like

pigments were mentioned only in a casual way in the first section of this article; hence, a further discussion seems appropriate at this point. First of all, we should present a definition of "tinting strength." The National Paint Dictionary and the American Society of Testing Materials use the same definition—"The coloring power of a given quantity

Paasche
AIRPAINTING EQUIPMENT
Airpainting parts for the famous Curtiss Caravan in a plant somewhere in Kentucky. Paasche Equipment speeds the job!

# WINGS for FINISHING

When Paasche Airpainting Equipment works for you, Finishing flows along at top speed. Paasche High Production Airbrushes provide fastest application of painting and finishing materials. Exclusive design of Paasche Material Tanks saves time in paint handling.

But time-saving is only one of the many advantages gained. The Paasche Water Wash Booths (interior shown above) reduce fire hazards, provide healthier, cleaner surroundings for workers, conserve paint and save cleaning time and cost.

Send for your copy of the new Paasche catalog and at the same time get the assistance of our experienced engineering staff. We will be glad to assist you on your difficult or unusual Finishing problems and help you attain maximum production.

***Write*** **PAASCHE AIRBRUSH COMPANY**
**1917 Diversey Parkway, Chicago 14, Ill.**
**Paasche Airbrush (Canada) Ltd.**
**110 Elm Street, Toronto**

## PUT THIS GUN IN THE HANDS OF YOUR FINISHING MEN

***The Paasche CUB High-Production Airbrush provides extra rapid application of all painting and finishing materials; perfect atomization and spray pattern; it's easier to handle too, weighs only 22 ounces.***

Paasche AIRPAINTING EQUIPMENT

Manual, automatic and special airpainting equipment, airfinishing booths, pressure regulators, airconditioners for compressed air lines, air dusters and stripers.

**Consumption of the Various Important Pigments in the Paint Industry**
*(Supplied by the courtesy of the U. S. Dept. of Commerce)*

| Pigment | 1929 Tons | 1930 Tons | 1931 Tons | 1932 Tons | 1933 Tons | 1934 Tons | 1935 Tons | 1936 Tons | 1937 Tons | 1938 Tons |
|---|---|---|---|---|---|---|---|---|---|---|
| White lead | 136,526 | 91,563 | 91,832 | 63,399 | 68,368 | 75,008 | 91,297 | 113,363 | 93,580 | 93,788 |
| Basic lead sulfate | 13,435 | 9,573 | 8,311 | 5,689 | 7,072 | 6,611 | 7,770 | 8,124 | 8,255 | 5,024 |
| Litharge | 3,124 | 689 | 641 | 1,360 | 610 | 414 | 564 | 4,247 | 3,366 | 2,449 |
| Red lead | 11,855 | 10,906 | 9,256 | 6,389 | 7,182 | 8,766 | 8,721 | 11,786 | 10,440 | 8,698 |
| Zinc oxide | ..... | ..... | ..... | 22,369 | 29,218 | 23,741 | 25,289 | 33,149 | 27,987 | 20,884 |
| Leaded zinc | ..... | ..... | ..... | 14,072 | 22,488 | 20,376 | 29,632 | 40,156 | 39,584 | 37,348 |
| Lithopone | 150,804 | 126,076 | 119,446 | 93,465 | 106,995 | 114,472 | 124,615 | 122,461 | 122,915 | 101,924 |
| Blanc fixe | ..... | ..... | 31,651 | 14,454 | 30,744 | 18,115 | 18,067 | ..... | ..... | ..... |

Percentage of Total Pigments Consumed by Paint Industry

| | White Lead % | Basic Lead Sulfate % | Litharge % | Red Lead % | Zinc Oxide % | Leaded Zinc % | Lithopone % |
|---|---|---|---|---|---|---|---|
| 1929 | 92.8 | 79.9 | 3.6 | 27.6 | .... | .... | 73.1 |
| 1930 | 89.6 | 83.0 | 1.0 | 33.1 | .... | .... | 76.8 |
| 1931 | 94.3 | 85.8 | 1.0 | 35.8 | .... | .... | 77.1 |
| 1932 | 95.1 | 90.9 | 2.3 | 33.8 | 31.0 | 98.2 | 76.8 |
| 1933 | 93.7 | 89.0 | 1.0 | 32.7 | 29.7 | 98.3 | 76.0 |
| 1934 | 95.3 | 93.5 | 0.6 | 32.8 | 27.3 | 99.4 | 71.9 |
| 1935 | 94.3 | 93.6 | 0.7 | 30.3 | 25.3 | 98.9 | 78.1 |
| 1936 | 95.8 | 96.4 | 4.9 | 33.9 | 26.1 | 99.1 | 77.4 |
| 1937 | 95.2 | 95.7 | 4.0 | 30.7 | 24.4 | 98.1 | 79.4 |
| 1938 | 94.7 | 86.7 | 3.6 | 28.8 | 26.4 | .... | 81.1 |

of a pigment which is selected as a medium standard for estimating such power." Also sometimes called "staining power."

The subject of tinting strength and hiding power is one of considerable controversy among the manufacturers of this important raw material. It appears that the greatest cause for this is the fact that various methods for conducting the test will reveal the sample under test as being either superior or inferior, according to the method used. In order to eliminate this conflicting condition, it is suggested that the methods of the A. S. T. M. or the Bureau of Standards be adopted. These are usually unbiased and are preferable for that reason.

Presented on the following page are some typical values for this important physical property. They represent average figures of several commercial samples and not any specific pigment.

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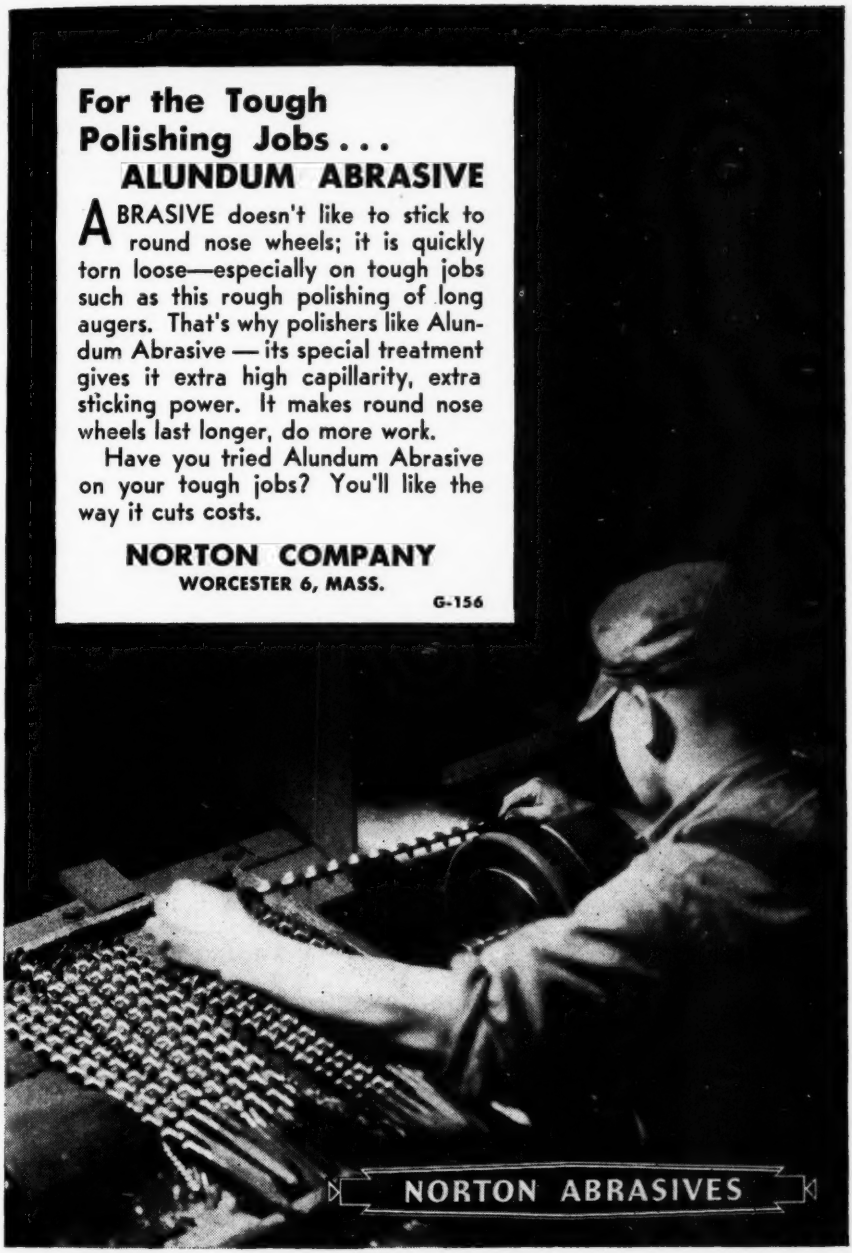
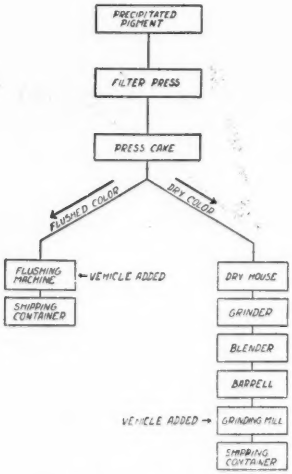


**Tinting Strength and Hiding Power of White Pigments**

| Name of Pigment | Tinting Strength | Hiding Power, Sq. Ft. per Lb. | Hiding Units |
|---|---|---|---|
| Basic lead carbonate | 100 | 15 | 1.00 |
| Basic lead sulfate | 85 | 13 | 0.87 |
| Zinc oxide | 200 | 20 | 1.33 |
| Zinc oxide (35% leaded) | 170 | 20 | 1.33 |
| Lithopone | 260 | 27 | 1.80 |
| Titanium barium pigment (A) | 380 | 40 | 2.67 |
| Titanium barium pigment (B) | 430 | 46 | 3.07 |
| High-strength lithopone | 400 | 44 | 2.93 |
| Titanated lithopone | 400 | 44 | 2.93 |
| Titanium calcium pigment | 450 | 48 | 3.20 |
| Titanium magnesium pigment | 440 | 47 | 3.13 |
| Zinc sulfide | 540 | 58 | 3.87 |
| Lead titanate | 570 | 60 | 4.00 |
| Titanium dioxide | 1150 | 115 | 7.67 |

### Flushed Pigments

About a decade ago the introduction of flushed colors caused considerable comment and threatened to become the origin of an economic upset in the paint and varnish industry. However, the predicted difficulties and changes did not materialize to a very great extent.

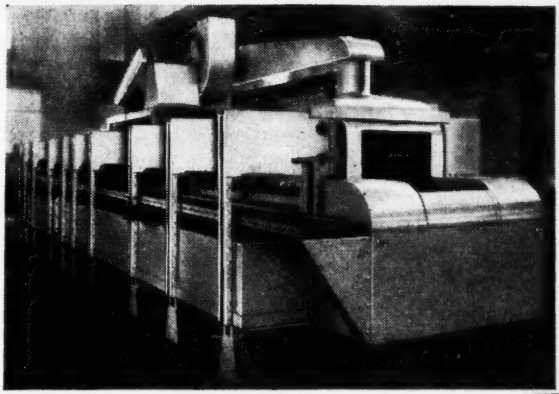



Flushed Pigments

Let us first give a description of just what flushed colors or flushed pigments are for the benefit of those who are not familiar with the term. These are chemically precipitated colors which are dispersed in a vehicle by a flushing machine. Unlike the methods used to produce dry pigments, the filter press cake is taken directly from the filter press and mixed with the desired vehicle. Since the pigment has a greater affinity for the vehicle than it has for the water, the pigment is preferentially wetted by the former. The water, which separates to the top of the flushing machine, is then poured off. (Note: A flushing machine is merely a large mechanical mixer somewhat similar to a large dough mixer of the type used by bakeries.)

### The Hall Process

Probably one of the most widely discussed inventions for producing aluminum bronze pigments is the Hall Process. This is an invention for making aluminum bronze pigment by the proper action of balls in a mill. The basis for the patent is an arrangement which produces



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maximum impact and minimum attrition. In this process it is possible to obtain a combination of grinding and flaking action, the most important contributing factor being

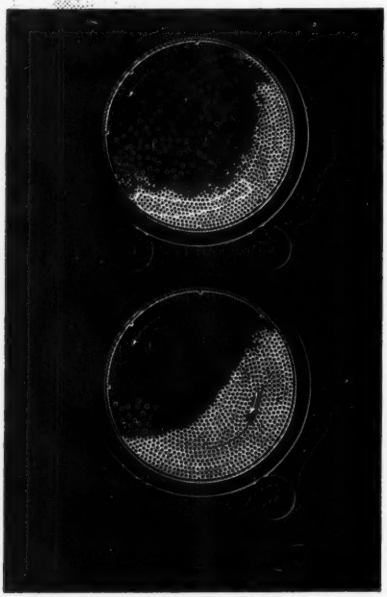

Diagram showing details of the Hall Method, a patented process for the production of aluminum bronze powders.

the speed of rotation of the mill. The accompanying diagram shows how simple but useful this invention is. Note that the optimum effect is obtained by rotating the mill at a speed to give the action shown in the upper section. This is contrasted by the inefficient action indicated by revolving the mill presented by the action shown in the lower section. A considerable amount of controversy was the outgrowth of this novel invention.

*(Conclusion)*

---

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## Credit Where Credit Is Due

AN interesting commentary on an article published in the March, 1944, issue of PRODUCTS FINISHING, has been sent to us by Kam N. Kathju, Technical Director, The Arco Company, Cleveland, Ohio. We quote from Mr. Kathju's letter:

"This morning's mail brought to my desk a copy of PRODUCTS FINISHING. One of the very interesting articles on page 36 through 40 by Mr. Jeffrey R. Stewart is entitled, 'Methods of Evaluating Metal Finishes.' While the article in itself is most helpful, I am personally of the opinion that the credit for the preparation of what is termed on page 36, 'U. S. Army Specification No. 100.12' should justly be given to the Engineers for I believe most of the work in connection with the preparation of the specification was done by the Engineers at Fort Belvoir, as well as Dayton.

"Frankly, as early as 1938 the Arco Company Research Laboratories had worked on this problem and early in 1941 applications covering the basic development of infra-red reflecting paints were the subject matter of an application filed with the U. S. Patent Office, generally referred to as the Hexter-Shepheard patent and assigned to the Arco Company. The Arco Company subsequently granted a free license to the U. S. Government under this patent 2294875."

---

**Sump-Vac Sump Cleaner.** An attractive four-page bulletin describes the Spencer Sump-Vac, a portable vacuum producer which cleans machine sump tanks in two to ten minutes. Also briefly described are applications of Spencer industrial vacuum cleaners and turbo-compressors, in ordinary and special cleaning and as an aid to countless industrial processes. A copy of Bulletin 130 may be obtained on request from the Spencer Turbine Company, Hartford 6, Connecticut.

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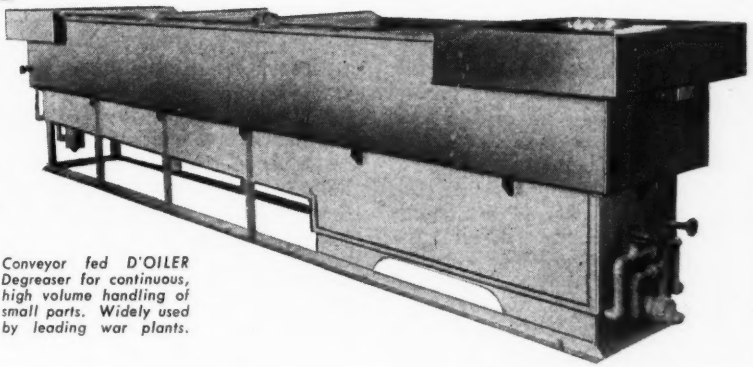

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# The Chemistry of Electroplating

By Dr. C. B. F. Young, Consultant

## Part 8

WHEN many materials are dissolved in solutions—for instance, sugar in water—one knows that certain changes take place. The boiling point is raised a definite amount while the freezing point is lowered a definite amount. Examples of these have been pointed out in previous articles. Now, if instead of sugar, sodium chloride is dissolved in water, here again an elevated boiling point or a lowered freezing point is obtained, but a peculiarity is exhibited. If a gram molecular weight is dissolved in solution instead of getting the normal increase of the boiling point or lowering of the freezing point, a result is obtained which in either case is about twice the calculated amount. Thus it can be readily seen that salt and sugar are two different types of materials. Let us investigate this difference further.

If the sugar solution is introduced into a glass container which contains two electrodes connected in series with an ordinary lamp and a current applied, the lamp will not glow. This simply means that the current, in order to get to the lamp, must pass through the solution and in this case the solution does not conduct it. If the sodium chloride solution is substituted for the sugar solution the lamp at once begins to burn.

It would be rather logical to assume that the solutions which are abnormal in respect to the raising of their boiling points or lowering of their freezing points would conduct electric current. If an acid or a base or other salts are substituted for the sodium chloride the abnormal effects are always noted. Thus, it can be said that acids, bases and salts undoubtedly break up when dissolved in solutions so that the resulting particles of the solute are greater than the case of molecular concentrations. For this reason, the boiling point is increased, the freezing point is decreased, and the solution conducts an electric current.

The reason for this seems to be as follows: Water boils at 100 degrees C. Now if a foreign material is added, such as sugar, the molecules of water are hindered in going into the vapor state because of the resistance of the foreign particles, namely, sugar, and the more particles of sugar added, the more the boiling point will be raised. Now, if a corresponding amount of salt increases the boiling point more than ever, it can be seen that this is due to the fact that undoubtedly the salt

breaks down in solution to produce more particles than are present in the molecular concentration. This seems to be carried out because acids, bases and salts all conduct an electric current.

A rather striking effect of the breaking up of acids, bases and salts in solution can be presented by examining the reaction below. If solid silver nitrate is added to solid sodium chloride (no water present whatsoever) much to our surprise no reaction results. Ordinarily a white precipitate of silver chloride would be formed, but in this case no white precipitate of silver chloride is produced. However, if the silver nitrate is dissolved in water and sodium chloride is also dissolved in another portion of water and the two solutions mixed immediately, a white precipitate occurs according to the equation

$$AgNO_3 + NaCl = AgCl\downarrow + NaNO_3$$

Thus, one can see that the silver nitrate breaks down as does the sodium chloride when dissolved in water. In this case the silver particle has a tendency to break away from the nitrate radical and the sodium has a tendency to wander from the chloride. At this point it must be noted that the silver thus produced is entirely different from metallic silver and the sodium is quite changed from metallic sodium. The same can be said about the chlorine present. Let us look at the properties of these elements.

**Properties of Free Element Sodium**

A silver colored metallic element which is very active. Combines with water to produce sodium hydroxide.

$$2Na + 2H_2O = 2NaOH + H_2$$

It has a melting point of 97.5 degrees and a specific gravity of 0.97.

**Properties of Combined Element Dissolved Sodium**

This material is colorless. Will not react with water and cannot be obtained in the free state.

**Chlorine**

A greenish yellowish gas, poisonous, moderately soluble in water as follows:

$$Cl_2 + H_2O = HCl + HOCl$$

Can be used as an oxidizing agent as follows:

$$2Sb + 3Cl_2 = 2SBCl_3$$

**Combined Chlorine**

This material is colorless, odorless and non-poisonous (in fact used for food in many cases). It cannot be used as an oxidizing agent.

From the above table it can readily be seen that there is quite a difference between the free element and the combined element. It is also possible to see that all elements dissolved do not act the same way for, as has been seen, salt will conduct an electric current while sugar will not. Materials which conduct electric current are called electrolytes, and solutions which do not conduct an electric current are called non-electrolytes. Thus one can assume that in all cases of electrolytes the molecule breaks up into two or more parts which are free to move around in solution.

Arrhenius suggested the theory of ionization in 1887. This theory assumes the following:

1. Certain materials, when dissolved in certain solvents, break up into small particles called ions.
2. These ions are either positively or negatively charged.
3. The sum of the positive charges equal the sum of the negative charges.

Arrhenius made one other assumption which has to do with the effect of dilution, but we are not particularly interested in this case and shall omit it. It might be well to

discuss the assumptions in the order given.

1. It will be noted that certain materials, not all materials, will dissolve in certain solvents, forming small particles. And, here, again we specify some solvents. For instance, sugar can be dissolved in water but it does not break up, while salt dissolves in water and does break up into small particles called ions. It can also be seen that if there is an abnormal raising or lowering of the boiling point or freezing point respectively, ionization takes place.

2. The materials on some ions have a certain charge of electricity which is in one case positive (+) and in the other case negative (—). From our knowledge of electricity it is known that unlike charges attract, while like charges repel; thus an electrode which is positive will collect negative particles. An electrode which is negative will collect positive particles. A positive electrode will repel or push away positive charges, while the negative electrodes push away or repel negative charges.

3. Using the information that has been taught so far, one can now write equations in a somewhat different manner than heretofore. Thus, for sodium chloride uniting with silver nitrate:

$$\begin{array}{l} AgNO_3 = Ag^+ + NO^-_3 \\ NaCl = Cl^- + Na^+ \\ \qquad\qquad \downarrow \quad \uparrow\downarrow \\ \qquad\qquad AgCl \quad Na^+NO^-_3 \end{array}$$

This reaction can also be written:

$$Ag^+NO^-_3 + Na^+Cl^- = AgCl + Na^+NO^-_3$$

The first equation shows it is necessary for silver nitrate to break up into positively charged silver ion and negatively charged nitrate ion, while the sodium chloride forms positive sodium ion and the negative chloride ion. These ions in turn unite to give silver chloride plus sodium nitrate.

The second equation gives this whole reaction in one step as can be seen from the equation. It will be noted that no positive or negative charge is written above the AgCl. This is because the AgCl is insoluble and precipitates out of solution, but everything that stays in solution has a positive and negative charge. The proper way to write ionic equations will be taken up in a future article.

It can be pointed out that in the case of sodium chloride this material ionizes as follows:

$$NaCl = Na^+ + Cl$$

If one could add an electron to sodium, an atom of sodium will be produced as follows:

$$Na^+ + \theta = Na$$

(Theta, $\theta$, is a Greek letter used to designate one negative charge of electricity). Thus $Na^+$ has a surplus of one positive charge. Due to reasons best known to the electrochemist, it has been found that positive charges do not migrate because of their great bulk, but only negative charges move about due to their light weight. When it is said that a surplus of one positive charge is present as in the case of $Na^+$, this means that one negative charge has been lost, which is the same thing as saying one positive charge has been gained.

The reverse is also true. If an excess of one positive charge is present, as in the case of $Na^+$, and one negative charge or one $\theta$ is added, we will get a neutral atom again because the negative charge neutralizes the excess positive charge. The equation can be written thus:

$$Na^+ + \theta = Na^\circ$$

The reverse reaction is also true:

$$Na^\circ - 1\theta = Na^+$$

In the former case one electron was added to neutralize the excess positive charge. In the latter case one negative charge was taken away

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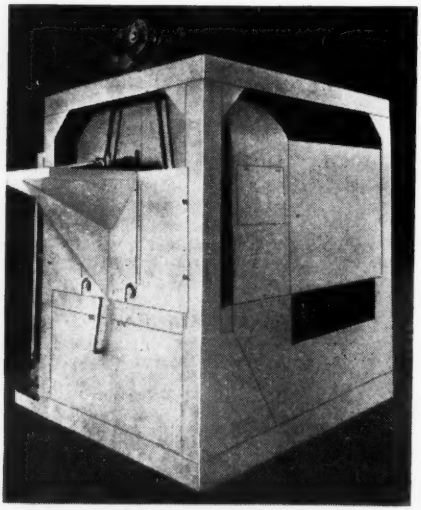

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to produce a sodium with a positive charge. The only difference between sodium ion and metal sodium is the absence or presence of a negative charge of electricity. Sodium ion, having a positive charge, will go to the negative electrode or cathode. Chlorine, on the other hand, when in the form of a chloride ion having a negative charge, will go to the positive electrode or anode.

When a direct current is passed through a solution, definite reactions take place at the point where the current enters and at the point where it leaves the solution. The positive electrode is called the anode and the negative electrode is called the cathode. Thus, sodium, which is positively charged, will go to the cathode while chlorine, which is negatively charged, will go to the anode.

There are two different products of electrolysis; these are primary and secondary materials. A primary product is obtained when the material decomposed is released without further chemical reaction taking place.

A good example of this is the electrolysis of copper chloride. The copper chloride placed in solution ionizes to produce copper ions and chloride ions. The copper ions being positively charged migrate to the cathode and there the copper ion is reduced to metal copper and as such can be obtained from the solution. The chloride ions migrate to the anode and become chlorine. Thus chloride is decomposed into its component parts and the copper and the chlorine are recovered as such. One might ask the question at this point just why the copper ion and chlorine ion became metal copper and gaseous chlorine respectively. On examining these two, if we write the equation, it can be seen that

$$CuCl_2 = Cu^{++} + 2Cl^-$$

This means that copper, in order to become metal copper, must gain

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two negative charges of electricity or two $\theta$, which is also known as two electrons, for an electron is a negative charge of electricity. Now, on the other hand, two chloride particles are present, which must lose two electrons in order to become gaseous chlorine. How can this be brought about?

It will be recalled that the anode has an excess of positive charges, which is another way of saying that it lacks negative charges, while the cathode has an excess of negative charges. Thus, it can be seen that the anode will absorb negative charges. Now copper, being positive, migrates to the cathode which is negative and the cathode, having an excess of negative charges, gives up two electrons as follows: $Cu^{++} + 2\theta = Cu^{o}$, which is metallic copper.

In the same manner the anode, being positive, attracts the chlorine which is negative. In this case the chlorine gives up its two electrons to the anode and becomes gaseous chlorine. Thus:

$$2Cl^{-} - 2\theta = Cl_2$$

If the student will examine this setup he will see that at the anode, negative charges are absorbed and at the cathode, negative charges are given up. Thus negative charges are passed through from the cathode to the anode and electrolysis depends upon this flow of electric charges. The electrons enter at the cathode, pass through the solution, go over to the anode and then pass out the metallic conductors through the generator and back again to the cathode. This will be clear by analyzing Diagram VI. From this derivation it will be seen that the electrons flow from negative to positive, but by other reasons it can be proved that the current flows from anode to cathode. Therefore, the electrons flow in the reverse direction from the current.

When products are liberated during electrolysis of aqueous solutions which are reactive with water, secondary products will be obtained. If an aqueous solution of sodium chloride is electrolyzed, the sodium ions

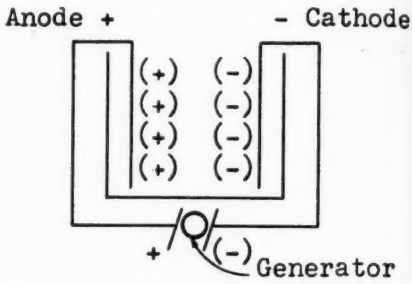


Diagram VI.

go to the cathode and gain an electron and become free sodium metal. It must be remembered, however, that sodium is very reactive with water and immediately the following reaction takes place:

$$2Na + 2H_2O = 2NaOH + H_2$$

Therefore, at the cathode, instead of obtaining sodium metal, hydrogen is produced. At the anode the chlorine gives up its charge and forms chlorine gas. In this case, hydrogen, sodium hydroxide, and chlorine are produced. Such secondary reactions will happen when potassium, sodium, barium, strontium, and calcium salts are electrolyzed in the presence of water. Secondary products are also formed when negative ions composed of more than one element are used, such as nitrates, sulfates, and so on. The secondary products, of course, will be formed at the anode, in this case, instead of at the cathode, as above.

The electrolysis of copper sulfate is a good example. When copper

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sulfate is dissolved in water, the following takes place:

$$CuSO_4 = Cu^{++} + So^{--}_4$$

If this is electrolyzed, the copper ion migrates to the cathode and is discharged as metallic copper. The sulfate ions are attracted to the anode. The sulfate icns, on being liberated, react with the water as follows:

$$2SO^{=}_4 + 2H_2O = 2H_2SO_4 + O_2$$

Here the sulfate ions are very reactive. They unite with the hydrogen in water to produce sulfuric acid and oxygen. Thus, the final products are copper at the cathode, oxygen at the anode, and sulfuric acid in solution. It will be noted that all of these take place when insoluble anodes are used, such as platinum. This does not apply in cases where soluble anodes are used. A good example of insoluble anodes in the plating plant is lead in chromium plating baths.

The electron is the smallest part of negative electricity that can be transferred from one atom to another. It has a maximum weight of $\frac{1}{1845}$ of the atom of hydrogen. The positive charge of electricity, which is the proton, is equivalent to a hydrogen atom; therefore, it is approximately 1845 times larger than the electron.

*(Part 9 will be published in our June issue.)*

## *Safety Shop Serves Workers on the Job*

WALTER KIDDE & COMPANY, Belleville, N. J., pioneers in the development of carbon dioxide fire-fighting equipment, is beating accidents to the punch with a mobile safety shop which travels from plant to plant giving workers the opportunity to purchase protective clothing on the spot. Stocked with safety shoes, goggles, face shields, respirators, gas masks and such protective clothing as aprons, smocks, gloves and caps, the shop is rolled to workers at their machines where garments are fitted by the safety serviceman or arrangements are made for the cleaning or repairing of worn safety equipment. The safety shop stays three or four days in each plant.

Stressing the point that no one wants to be injured, no one wants to lose time, no one wants to lose pay, every effort is being made by Kidde to improve its record which read: one-third of lost time attributed to foot injuries or accidents caused by slipping. It is estimated that the wearing of safety shoes will practically eliminate injuries to the feet and drastically reduce injuries due to slipping.

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6342 EAST JEFFERSON • DETROIT 7, MICHIGAN

# *Special Equipment Feeds Parts to Pickling Bath*

THE Lyon-Raymond Corporation, 1453 Madison St., Greene, N. Y., recently was called upon by one of its customers to develop a special piece of equipment for automatically feeding processed parts to a pickling bath.

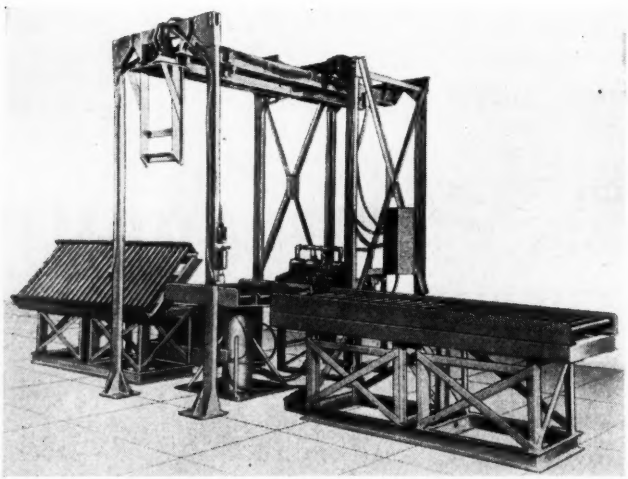
In this operation a large, empty wire basket is placed on the tilting conveyor table shown in the left hand side of the illustration. This table is tilted to place the basket in a more convenient position for loading. The table is then hydraulically lowered to its horizontal position and the basket of parts rolled onto the elevating table.

The operator then presses an electric push button which starts a sequence of the following operations, all of which are automatic until the table returns to its original lowered position.

The table elevates hydraulically 38 inches and during its elevation turns 90 degrees. Upon reaching its full elevated height, it automatically starts a pusher (the end of which is shown between the two front uprights) which travels across the table and pushes the basket off the table onto another roller conveyor (not shown in the illustration). The basket is then pushed into the pickling bath. The pusher returns to its original position and the table lowers and turns 90 degrees back to its starting position.

During this sequence of operations, the operator on the right side of the elevating table has tilted his table hydraulically, loaded the basket, lowered it hydraulically to its horizontal position and is ready to push the basket onto the elevating table as soon as it reaches its lowered position.

The elevating and turning of the table, the pusher operation and the return of both to their original position is all automatically accomplished in 30 seconds. These operations are obtained hydraulically, controlled by limited switches and solenoid-operated hydraulic valves. The only manual operation of this sequence is pushing the starter button at the beginning of the cycle.



This Lyon-Raymond automatic hydraulic elevating turn table was especially designed for automatically feeding processed parts to a pickling bath.

## WHEN YOU CHECK UP ON YOUR PLANT'S PAY-ROLL SAVINGS PLAN FIGURES!

**These days, things change with astonishing speed. The Pay-Roll Savings Plan set-up that appeared to be an outstanding job a short time ago, may be less than satisfactory today.**

**Check up on *your* plant. Check up to see if all are playing their parts to the full. Check up to see if 'multiple-salary-families' are setting correspondingly multiple-savings records.**

**Other groups may need attention. Workers who have come in since your plant's last concerted bond effort. Or, those who have advanced in pay, but not in their bond buying. Or those who never took part in the plan at all. A little planned selling may step contributions up materially.**

**Your job isn't finished, even when you've jacked participation up to the top. You've still got a job before you! The task of educating your workers to the necessity of not only buying bonds, but of *holding* them. Of teaching that a bond sold before full maturity is a bond robbed of its chance to return full value to its owner—or his country!**

**So start *checking* . . . and *teaching* . . . today!**

**War Bonds To Have And To Hold!**

**LET'S ALL BACK THE ATTACK WITH WAR BONDS!**

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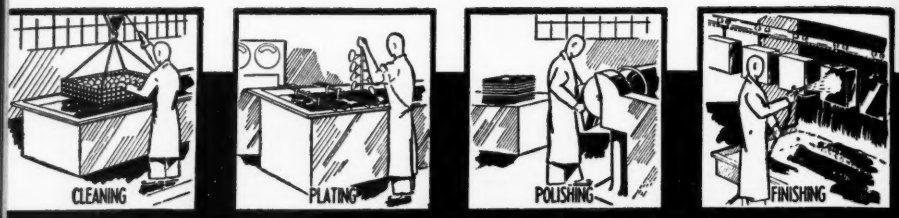



# News of the Industry

## Cowles Research Further Expands

In line with the recently announced research expansion program, Dr. Clinton W. MacMullen, technical director of the Cowles Detergent Company, 7016 Euclid Ave., Cleveland, Ohio, announces the following additions to the research staff:

Dr. Frederic C. Jelen who graduated from Massachusetts Institute of Technology in 1931. He received his Master's degree from the same institution, as well as another Master's degree and his PhD. from Harvard in 1935. Since that time Dr. Jelen has been with the Monsanto Chemical Company and the Battelle Memorial Institute, from which he comes to Cowles.

Dr. Frederic C. Jelen

R. C. Shaver, a 1939 graduate of Syracuse University, with a Master's degree in chemistry. He has been an industrial fellow and on the teaching staff at Syracuse. He formerly worked in the laboratories of the Sealright Company, Inc.

Noel R. Phillips, graduated from the New York State College of Forestry, Syracuse University in 1941. He was employed as chemist by the Southland Paper Mills and R. T. Vanderbilt Company prior to joining Cowles.

John L. Biester, received his undergraduate training at Beloit College and his Master's degree at Syracuse in 1943. He was formerly in the research department of the Standard Oil Company of Indiana.

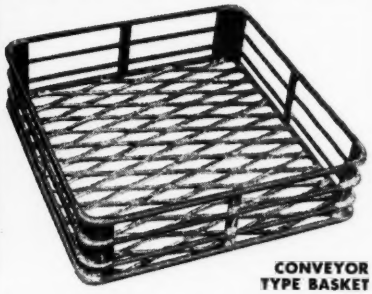
## New Location of Ohio Equipment Company

In order to provide the best possible service for its customers, the Ohio Equipment Company, materials handling equipment representatives, has moved to new quarters at 1367 E. 6th St., Cleveland 14, Ohio, opposite the Cleveland Public Auditorium. The change was recently announced by E. M. Abramson, president.

## Jackson-Lansing A.E.S. Branch

Plans have been made by the Jackson-Lansing (Michigan) Branch of the American Electroplaters' Society for its First Annual Educational Session on May 13 at the Hayes Hotel, Jackson,

# CARPENTER METAL BASKETS



CONVEYOR TYPE BASKET

Carpenter metal baskets are made to meet practically every cleaning, pickling, washing, and heat treating operation. They can be supplied in steel, stainless steel, Monel metal, and Inconel—in sizes and types to suit your needs.

Write for illustrated folder describing our complete line of baskets.

*"If it's a metal basket we make it."*

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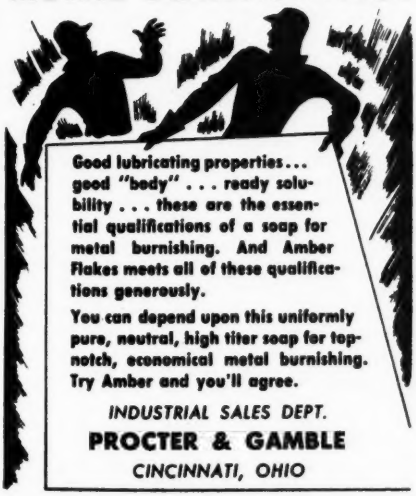
**446 East 131st St. . Cleveland, Ohio**

# AMBER FLAKES
## for efficient, economical METAL BURNISHING!



**Good lubricating properties... good "body" . . . ready solubility . . . these are the essential qualifications of a soap for metal burnishing. And Amber Flakes meets all of these qualifications generously.**

**You can depend upon this uniformly pure, neutral, high titer soap for top-notch, economical metal burnishing. Try Amber and you'll agree.**

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**PROCTER & GAMBLE**
*CINCINNATI, OHIO*

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**can be destroyed by RUST**

***. . . prevent this waste by using* STUART**

# RUSTEX No. 2
## SURFACE CONDITIONER

***in soluble cutting oil***
***in water test tanks***
***in cleaning and rinsing tanks***

A plain white powder . . . harmless to hands or clothing . . . but your definite insurance against RUST. It *will not* injure the most highly finished metal surfaces nor will it *measureably increase the physical dimensions.*

ONLY a very little of RUSTEX No. 2 will do the job—just add ¼ to ½ oz. to a gallon of water.

RUSTEX No. 2 is now being used by many large manufacturers.

**[ WE GUARANTEE every pound of RUSTEX No. 2 to do what we claim for it. You must be satisfied. ]**

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***A Quarter Century of Successful Service to Industry***

Mich. Three nationally prominent speakers have been engaged to conduct the educational program.

Entertainment will be furnished for the ladies during the afternoon session. The evening program features a banquet, floor show and dancing. The tickets are $2.50 each and reservations should be made with William Webb, 1924 South West Ave., Jackson, Michigan.

The membership of this chapter is representative of the majority of the industrial organizations in the central part of Michigan. Meetings are held on the second Tuesday of each month and the location is alternated between Jackson and Lansing.

## Norton Appointments

Philip H. Clapp has been appointed abrasive division district manager for the Pacific coast by Norton Company, Worcester, Mass. He will make his headquarters in Los Angeles. Mr. Clapp has been with Norton Company for 30 years and since 1935 has been abrasive division district manager in Detroit. Previous to that he was for many years the Norton abrasive engineer in the California area.

Donald L. Price has been appointed abrasive division district manager in Detroit succeeding Mr. Clapp. Mr. Price has been with Norton Company for 24 years and since 1926 has been located in the Detroit district as field engineer and abrasive engineer.

## Davis Addresses A.E.S. Group

A paper on specification gold plating by J. Frank Davis was read before a meeting of the Providence - Attleboro Branch of the American Electroplaters' Society at the Providence Biltmore Hotel on March 20. The address was given under the auspices of A. Robinson & Son, 131 Canal St., New York City.

A very limited number of copies of the talk are available to plating foremen; requests should be addressed to the company at the address given above.

## Stanton Joins Magnus

The Magnus Chemical Company, Inc., Garwood, N. J., announces the appointment of Avery H. Stanton as technical engineering consultant. Mr. Stanton, a graduate of Massachusetts Institute of Technology, was formerly with the War Production Board in Washington.

He is well known to the pulp and paper industry, having been actively associated with this industry for a number of years prior to serving in Washington. The major portion of Mr. Stanton's activities in his new position will be devoted to government agencies and the pulp and paper industry in regard to industrial cleaning and process control compounds.

## New DuPont Public Relations Director

The appointment of Harold Brayman to be director of the public relations department was announced today by E. I. du Pont de Nemours and Company, Wilmington, Del. He succeeds the late Theodore G. Joslin, who died suddenly April 12.

Assistant director of the department since 1942, Mr. Brayman was a Washington correspondent and columnist before joining the company. He was president of the National Press Club in 1938 and of the Gridiron Club in 1941.

## Amercoat Occupies New Quarters

The Chicago sales office of the Amercoat Division of American Pipe and Construction Co., Los Angeles, Calif., now occupies new quarters in Suite 341, McJunkin Bldg., 4554 N. Broadway, Chicago, Ill. The move to larger quarters was announced by R. A. Glasgow, general sales manager, who will make his headquarters there. With J. W. Staples, Jr., Amercoat sales representative, he will continue to serve industrial firms in Chicago and surrounding territory.

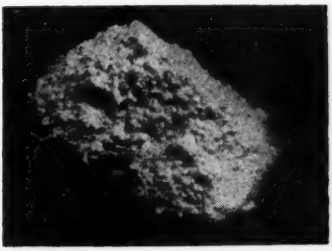
## Standard Varnish Expands

Announcement is made by M. H. Corbin, sales director of the Industrial Division of Standard Varnish Works, Staten Island, N. Y., of the appointment of C. R. W. Thomas to the technical staff of sales and service engineers.

Mr. Thomas holds M.A. and Ph.D. degrees from the University of Pennsylvania. He was formerly associate professor at the U. S. Naval Academy in

## Examine the many industrial uses of

# FLOCK



**Flock (finely cut particles of cotton or rayon) is being used industrially to coat or build up a wide variety of surfaces—either to change the appearance to simulate leather, fabric, velvet, upholstery, etc., or for such functional purposes as sound-deadening, insulating, shock-absorbing, built-in gaskets, etc.**

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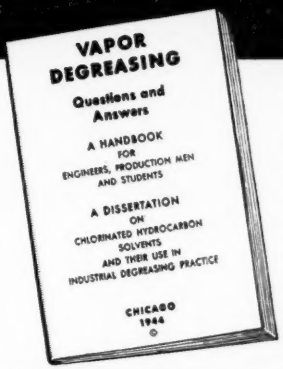
## Solves Metal Cleaning Problems


VAPOR DEGREASING
Questions and Answers
A HANDBOOK FOR ENGINEERS, PRODUCTION MEN AND STUDENTS
A DISSERTATION ON CHLORINATED HYDROCARBON SOLVENTS AND THEIR USE IN INDUSTRIAL DEGREASING PRACTICE
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If you are concerned with industrial solvents and degreasing in any way—you will find this new book a source of much valuable practical information. It is the last word on the rapidly growing field of Vapor Degreasing—an unbiased, factual presentation of the subject. Written by a leading metal-cleaning engineer, in clear, concise question and answer form—this illustrated handbook takes up every phase of vapor degreasing including: Types of work that can be handled by vapor degreasing, recovery of solvents, toxicity, degreasing of bowl-shaped parts, proper size of degreasers, special uses for degreasers, and many other problems.

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Annapolis, and associate editor of U. S. Naval Institute Proceedings. He has also had many years of experience directly in the protective coating industry. Mr. Thomas will be in charge of sales and service activities for Standard Varnish Works in the Baltimore territory.

## Wheelco Instruments Company

Assets of Wheelco Instruments Co., 847 W. Harrison St., Chicago, Ill., have been purchased by Fred A. Hansen and Cary H. Stevenson, vice presidents of the Lindberg Engineering Co., Chicago, and several associates. The business of the

Richard Schoenfeld

industrial instruments firm will be continued at the same location under a new corporation, the Wheelco Instruments Company.

Officers of the new company are Hansen, president; Stevenson, secretary and treasurer; and Richard Schoenfeld and Theodore Cohen, vice presidents of the old company, as vice presidents. Schoenfeld will be in charge of sales and production.

Wheelco Instruments Company owns a six-story building at Peoria and Harrison Sts., Chicago, where it manufactures a line of industrial instruments incorporating electronic control. The new company will expand further into other industrial applications of electronics and supersonics.

The original Wheelco firm was formed in 1936 by a merger of Wheelco Vacuum Products Company, manufacturers of electronic tubes, and Thermo Control Devices Company, manufacturers of industrial instruments. Hansen and Stevenson will continue to be active in the management of Lindberg Engineering Co.

## Conway Joins Udylite Corporation

Bernard J. Conway, for 12 years connected with the Proctor Electric Company, Philadelphia, Pa., has recently become a member of the engineering and service staff of the Udylite Corporation's New York Office. Mr. Conway's experience as manager of the buffing and polishing division and later as head of all metal finishing operations at the Proctor Company especially qualifies him for his new work.

He will be in charge of the territory comprised of all southeastern Pennsylvania and southern New Jersey. His headquarters will be Philadelphia.

## Additions to Pennsalt Staff

Pennsylvania Salt Manufacturing Company, Philadelphia, Pa., announces the following additions to its research and development department staff: Dr. R. D. Evans, formerly with New Jersey Zinc Company; E. A. Bruce of Blaw-Knox Company; F. W. Jakob, recently discharged from the U. S. Army as first lieutenant and graduate of Pennsylvania Military College; J. L. Staubly of National Association of Dyers and Cleaners; J. M. Swales of U. S. Navy Inspection Department; J. J. McBride of Franklin Research Company; Katherine Dilworth of Delaware County Hospital, and Gertrude Schutze of National Broadcasting Corporation.

New staff members also include Mar-

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Write today for full data on how you can adopt the LUPOMATIC DEBURRMASTER equipment for deburring parts for the duration and for post-war plans, saving 85% of your finishing cost.

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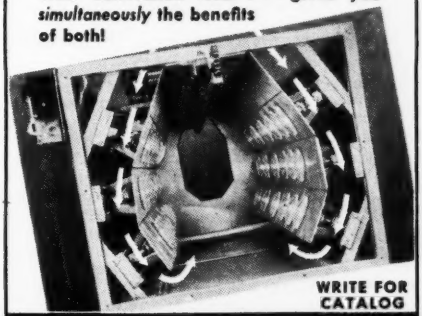
**REDUCE POWER COSTS • SAVE LAMPS**
**Dual Heat *combines* Radiant Energy Heat with Convection Heat . . . gives you *simultaneously* the benefits of both!**

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LENBA-SOLV the new emulsifying cleaner, is the ideal solution of your metal cleaning problems. Actually dissolves all types of soil (oil, greases, buffing, cutting and lapping compounds of all types, cutting and machining coolants) on either ferrous or non-ferrous metals, by immersion and water rinse. (Stubborn cases may require gentle agitation). LENBA-SOLV is water soluble and is a powerful emulsifier and penetrant. Produces sparkling surfaces completely clean for all purposes. Will not stain or discolor. Is 100% safe, (160° F. Flash Point) odorless, stable, neutral—and extremely economical, because it emulsifies the dirt and grease which is carried off in the water rinse, keeping LENBA-SOLV clean indefinitely. Can be easily used with your present degreasing equipment or in any tank with heating equipment. Available in unlimited quantities on low priorities.

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### *ORDER TODAY!*

One drum of LENBA-SOLV will prove its merits to you. Order today—and we will rush it to you with full simple directions.

**LENBA-SOLV . . .**
**$44.50 per Drum, plus deposit.**

**Prices are f.o.b. New York or Chicago.**

garetta E. Aeugle of Duke University and Gladys Molyneux of Cornell University.

Thomas Toovey, well known pulp and paper specialist, has been transferred from sales service to the research and development department where he will have supervision of research and development work related to new and improved pulp and paper chemicals.

## American-Marietta Purchases Paint Firm

Expansion of the American-Marietta Company into the Southwest through the purchase of the Sewall Paint and Varnish Company has been announced by Grover M. Hermann, president. Acquisition of the 67-year-old company with plants in Kansas City and Dallas is part of an over-all expansion program that will include the construction of new factories and improvement and enlargement of present facilities when restrictions are lifted. This marks the fifth company purchased by American-Marietta during the past 10 years.

Officers of the new subsidiary are Albert C. Bale, president, with Sewall for 43 years, and E. Ross Kyger, vice president and general manager, with Sewall since 1910. Mr. Kyger also serves as president of the Sewall Paint and Varnish Company of Texas, and O. C. Johnson is general manager.

## Dr. V. N. Krivobok Joins International Nickel

Dr. V. N. Krivobok, a recognized authority on stainless steel and former professor of metallurgy at the Carnegie Institute of Technology, has become associated with the Development and Research Division of The International Nickel Company at New York. Dr. Krivobok's services will be utilized mainly in the development of markets for alloy and stainless steels and to assist steel manufacturers in expanding markets for their post-war products.

Residing at present in Glendale, Calif., Dr. Krivobok had until recently been chief metallurgist of the Lockheed Aircraft Corporation at Burbank. Before joining Lockheed in January, 1941, he had been professor of metallurgy at Carnegie Institute of Technology since 1924, while also serving as associate director of research for the Allegheny Ludlum Steel Corporation (1934-1940). From 1924 to 1934 he had been consulting metallurgist to several steel companies. Dr. Krivobok is a graduate of Harvard Engineering School.

## Officers of Chemical Fire Extinguisher Association

The Chemical Fire Extinguisher Association, at its annual meeting held recently at the Sherman Hotel in Chicago, elected the following officers: president, Arthur G. Sullivan, general sales manager, Buffalo Fire Appliance Corporation, Buffalo, N. Y.; vice president, J. O. Binford, general sales manager, American-La France-Foamite Corporation, Elmira, N. Y.; treasurer, Herman W. Diener, secretary, George W. Diener Manufacturing Company, Chicago, Ill.; and commissioner, W. J. Parker, W. J. Parker, Inc., New York City.

Newly elected directors, in addition to the above, are George H. Boucher, general sales manager, Pyrene Manufacturing Company, Newark, N. J., and E. A. Warren, vice president, General Detroit Corporation, Detroit, Michigan.

**BIONOL — Cleaner and Degreaser**

**FOR ALL METAL PARTS—BRASS, STEEL, ALUMINUM, PLASTICS**

**BIONOL**

**Solution lasts longer**
**Costs LESS**
**Cleans FASTER**

**Leaves chemically clean surface**
**Really gets parts CLEAN**
**No wiping, just rinse**

For automatic, dip or manual cleaning operations. Time, 1-3 minutes in solution. Now in use in many leading war plants. For perfect cleaning—use **BIONOL.**

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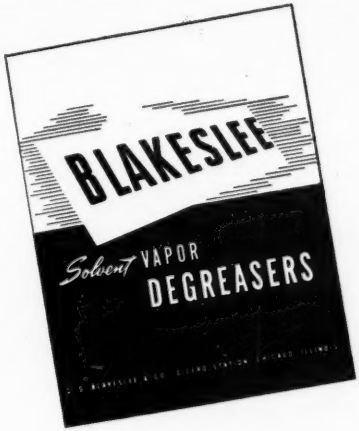
**BIOFEN LABORATORIES** ● **14 Sixth Street, Bridgeport 7, Conn.**

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● A new catalog on Blakeslee Degreasers. A 24-page book describing these fast, efficient degreasers, the many standard and special applications and the reasons Blakeslee Degreasers are the most economical in operation.

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## EASIER, FASTER, CLEANER!

**Utilizing a minimum of floor space, INDUSTRIAL machines completely remove oil, grease, lapping and drawing compounds, etc., quickly and economically. Small units are designed for laboratories, schools and specialized requirements. INDUSTRIAL engineers are available for consultation.**

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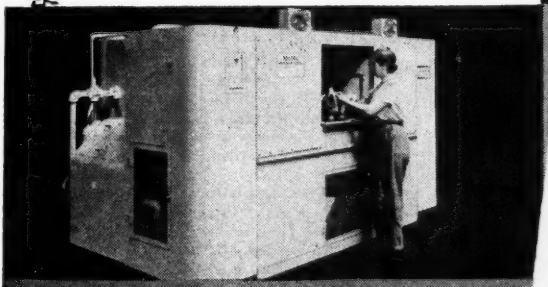

Engine cylinders and Pistons, Gears and Ball Bearings, Master Rods, Machined Parts, Piston Rings, Screw Machine Products, Valve Springs, Crank Cases, Metal Radio Tubes, Gas Meters, Plated Work, etc.

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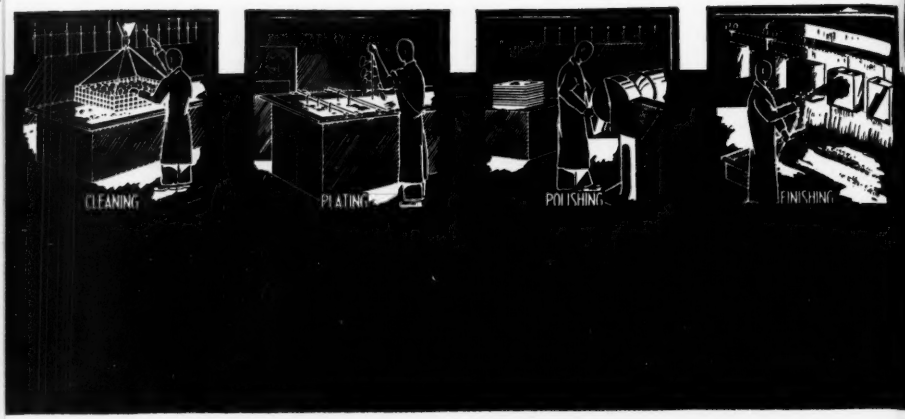
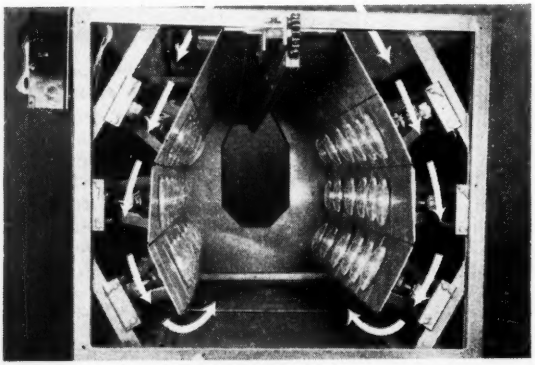



## Jensen "Dual Heat" Infra-Red Ovens

A line of infra-red ovens which provide an efficient method for baking, drying, preheating and dehydrating operations has been designed by Jensen Specialties, Inc., 12151 Grand River Ave., Detroit 4, Mich. "Dual heat" ovens efficiently combine radiant energy heat (heat transferred through radiant energy waves) with convection heat (heat transferred by means of air or gas currents).

The ovens are designed to meet the specific needs of the customer. They can be opposing horizontal or perpendicular banks, flat banks or oval in shape. They can be mounted on the floor or from the ceiling. They can accommodate the use of 125, 250 and 375-watt R-40 or RE-40 tungsten or carbon reflector-type lamps.

Basic advantages claimed for the "dual heat" system include the following: quick installation; easy operation; instant production; flexibility; fast heat transfer; reduction of product handling; visible operation, and uniform results.



Jensen "Dual Heat" Infra-Red Oven. Arrows show travel of air currents drawn in through the top of the oven and passing over the backs of the lamps and wiring.

## Bionol

Biofen Laboratories, 14 Sixth St., Bridgeport 7, Conn., have placed on the market a product designated as "Bionol," for use in cleaning and degreasing operations. Bionol is a yellow viscous liquid which is completely soluble in water in all proportions, easily emulsified in organic solvents, and partially soluble in alcohol. A Bionol solution can be used for the cleaning and degreasing of metal parts and also a wide variety of finished surfaces. It can also be used as a lubricant for metal drawing.

When Bionol is used for immersion cleaning, one part of Bionol is diluted

with four or more parts of water. The solution is heated to 140 deg. F., and the parts are dipped into the warm solution for one to three minutes. The parts are then rinsed in water.

It is claimed that Bionol is non-corrosive, non-caustic, non-toxic and harmless to the skin. Other advantages cited for this product are the short cleaning time, increased length of time cleaning solution is efficient, no water breaks, and successful cleaning without wiping —rinsing is sufficient. According to the manufacturer, a Bionol solution of 1-10 will clean and degrease an area of more than 1,000 square feet.

## Acidex

W. B. B. Corporation, 1701 W. Lehigh Ave., Philadelphia 32, Pa., has introduced a product known as "Acidex" for use in sulfuric pickling solutions. It is claimed that the use of Acidex reduces the generation of hydrogen and thus the amount of hydrogen which is included in the steel. It is also said that an Acidex pickling solution makes it possible to pickle at reduced temperatures and in a reduced amount of time.

With Acidex in the pickling bath, the solution selects the oxide rather than the steel, therefore, the manufacturer claims, metal loss and fumes are reduced, the steel surface is smoother and whiter, embrittlement is minimized, and acid consumption is reduced. The resultant surface is chemically clean.

Recommended use of Acidex is about one per cent based on the weight of acid in solution. The solution is usually made up with the required amount of cold water, then the acid is added, and the temperature is elevated to the desired point. Then Acidex (dry powder) is added and is instantly dissolved in the solution. When it becomes necessary to make additions of acid, a proportionate amount of Acidex is also added.

## "All-Out" Fire Extinguisher

The "All - Out" Fire Extinguisher manufactured by the National Powder Extinguisher Corporation, 50 Rockefeller Plaza, New York, N. Y., is shown in the illustration. Designed especially to extinguish both flammable liquids and fires of electrical origin, the extinguisher ejects a stream of All-Out dry chemical which, when activated by heat, forms a dense, fire-smothering cloud over a flaming area up to 18 feet. The insulating qualities of the cloud help guard against re-flash, and create a heat-deflecting screen between the operator and the flame, permitting close range attack with safety and no heat discomfort. The chemical, a non-conductor of electricity, is said to be harmless both to the users and to delicate, mechanized parts of motors or machinery.

Weighing only 37 lb. fully charged,

"All-Out" Fire Extinguisher

the All-Out extinguisher is easily maneuvered by men or women workers. It is fast in action and can be quickly recharged at the scene of a fire without special recharging equipment. According to the manufacturer, both the extinguisher and its extinguishing agent have been tested and approved by the Associated Factory Mutual Laboratories on burning oils, alcohol and gasoline fires.

## Pennsalt Lead Fluoborate Solutions

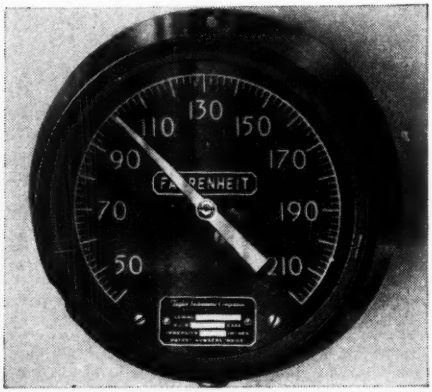
Of interest in the expanded field of lead electroplating are the lead fluoborate solutions offered by the Special Chemicals Division, Pennsylvania Salt Manufacturing Company, 1000 Widener Bldg., Philadelphia 7, Pa., under the trade names "Pennsalt LF 42" and "LF 50." Available in 42 per cent and 50 per cent Pb $(BF_4)_2$ concentrations, these solution are stabilized with excess fluoboric ($HBF_4$) and boric ($H_3BO_3$) acids in balanced percentages. For use, they are

diluted with water to the desired concentration.

Electroplating baths prepared from these solutions are said to be stable, give a smooth, fine-grained, dense deposit with cathode current efficiency of essentially 100 per cent, and permit plating directly on steel. Corrosion-resistant surfaces so produced replace critical metals, such as cadmium, zinc, chromium, copper and nickel. The solutions are available in commercial quantities in glass carboys.

## Taylor 4½-In. Dial Thermometer

Originally built for and extensively used by the shipbuilding industry, the Taylor 4½-in. phenolic case dial thermometer is shown here. A product of Tay-




Taylor 4½-In. Dial Thermometer

lor Instrument Companies, Rochester 1, N. Y., this mercury-actuated instrument is built to withstand severe operating conditions. Available with Accuratus Tubing, it is especially well suited to installations requiring a long length of tubing between the bulb and the instrument.

The plastic case is resistant to corrosion and shock. To make reading at a distance easy, the metal dial is finished in black with white figures. The 53K series mercury-actuated dial thermometer can be had with a wide variety of standard temperature-sensitive bulb constructions and is available in the following ranges: —40 to 120 deg. F.; 40 to 220 deg. F.; 350 to 550 deg. F.; 400 to 900 deg. F.; —10 to 110 deg. F.; 80 to 300 deg. F.; 300 to 750 deg. F.; 30 to 150 deg. F.; 50 to 400 deg. F., and 200 to 900 deg. F.

## Turco Solu-Gluv

A smooth white cream that disappears into the skin to form an invisible glove which prevents the penetration of grease, paint and dirt into the pores is a development announced by Turco Products, Inc., 6135 S. Central Ave., Los Angeles, Calif. Solu-Gluv is used much like vanishing cream. When it dries it forms an invisible film to which grease, paint, cutting oils and dirt adhere. At wash-up time, invisible glove, dirt, grease and paint are all rinsed off in ordinary water.

Mild as complexion soap, Solu-Gluv should add to the comfort of men and women whose work brings them into contact with cutting oils, paints, greases and solvents. Personnel handling paint should find it particularly valuable, since Solu-Gluv is said to eliminate the need for using paint thinners to remove paint from skin and hands. Applied freely to hands, arms, elbows and upper arms, Solu-Gluv prevents paint from adhering to the skin itself. The invisible glove holds the paint, which is washed off with water as the "glove" is rinsed away.

After Solu-Gluv has dried, the user is unaware of its presence. It does not interfere with the sense of touch, nor can it hinder the most delicate mechanical operations or inspection work. The use of Solu-Gluv reduces the stinging, smarting effect which some industrial solvents have on the skin. Several applications of Solu-Gluv throughout the working day are said to be sufficient to check the drying, irritating action of solvents even if exposure is frequent and prolonged.

## Birdseye RE-40 Infra-Red Lamp

A 375-watt reflector type infra-red heat lamp has been added to the Birdseye line marketed by the Wabash Appliance Corporation, 345 Carroll St., Brooklyn 31, N. Y. The lamp is made in clear and ruby glass.

This higher-wattage Birdseye RE-40

is designed to produce higher drying temperatures, which are not possible with available 250-watt sizes. With the addition of the 375-watt lamp, the Birdseye RE-40 reflector type infra-red heat lamp is now obtainable in 125, 250 and 375-watt sizes for flexible control of temperatures. The heat-proof Superlok base, a more efficient and durable ceramic heat reflector disc, the Wabash tungsten "M - Filament," and built-in reflector are standard features of the 375-watt lamp.

## Taeco Hood

A lightweight, air-supplied hood to protect workers in paint, chemical, metallizing, finishing and allied industries is announced by the Wesley A. Gibbons Company, Birmingham, Mich. Called the Taeco hood, it guards the eyes, ears, face, neck and respiratory organs from harmful and irritating substances, mists, vapors, fumes and dusts. It is designed to afford safety, comfort and freedom of body movement and to allow easy replacement of all parts. This pliable hood weighs only slightly more than a man's felt hat, and is

Taeco Hood

fitted with replaceable forehead pads.

Compressed air at low pressure, from the same supply used to service a spray gun or similar equipment, is fed into the hood through a distributing tube which is held in position at the operator's waist by a belt clip. A removable diffuser allows the air to expand and discharge at the top of the hood from where it floats down over the operator's head.

Two models of Taeco hoods are of-

"ROBINSON'S ASSAYED"

Gold Plating Solutions

*Are Nationally Endorsed*

MADE BY **A. Robinson & Son**
131 CANAL ST. NEW YORK

fered. One, called the Vapo hood, is designed for use principally for spraying paint and other liquids. The eye mask is cut out to prevent hampering of operator's vision by mist. Air flowing out through the eye opening keeps vapors from entering.

The other, called the Fumo hood, is designed for use in industries like metallizing or woodworking where irritating dusts or fumes may be prevalent. Its eye mask is closed and the air escapes at the neck.

## Miccrome Stop-Off Lacquer

A stop-off lacquer specifically developed for masking of parts for hard chrome plating has been announced by Michigan Chrome and Chemical Company, 6342 E. Jefferson Ave., Detroit 7, Mich. This material combines many of the most desirable characteristics of Miccro Supreme Stop-Off Lacquers HB-401 and HR-302, with several advantages—the chief of which is increased ease of removal.

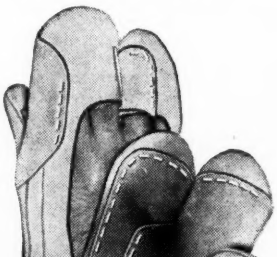
The lacquer, known as Miccrome, can be applied easily by brushing, dipping or spraying and provides a smoother and more even coating than the other two lacquers. It offers fast air-drying qualities and requires no force drying. During plating, it adheres perfectly even to surfaces which have been chrome plated.

After plating, Miccrome can be easily peeled or dissolved. It can be removed from hard-to-reach spots by hot soaking for a short interval and then blowing the remaining material off by the use of compressed air. Because of this feature, clean-up time is reduced to a minimum.

Miccrome is said to have excellent dielectric strength which provides accurate control of deposit and a minimum of current lost. As the material trims cleanly, it is always possible to secure a sharp line of demarcation of the work. Its clear red color gives definite contrast against the exposed surface.

## Steel Grip "Two-Finger" Work Handler

Shown in the illustration is a "two-finger" open back work handler which has proved efficient as general purpose hand protection. Designed recently for one of its customers by Industrial



Steel Grip "Two-Finger" Work Handler

Gloves Company, 746 Garfield Blvd., Danville, Ill., the hand pad is made of chrome tanned cowhide split leather. It carries a double thickness wearing surface across the entire palm and over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*WRITE*

**THE WM. M. PARKIN CO., • Highland Bldg., Pittsburgh, Pa.**

**NEP-ACID INHIBITOR—To Control Acid Action on Clean Metal**

**SUMFOAM PICKLING COMPOUND—To Control Fumes**

*"THOSE PERFECT PARTNERS FOR PICKLING"*

the side and back of the forefinger where so much severe wear comes. All seams are sewed with steel thread, making the guard practically rip-proof.

The open back construction means a cool, comfortable, flexible fit. An adjustable fastener at the wrist is another added feature for comfort to the wearer. The handler is designated as Steel Grip Safeguard No. 15096.

## Dulac Fungus-Resistant Lacquer

Communications equipment that soon became useless in tropical climates is now being protected from high humidity and fungus growth by a lacquer developed by Maas & Waldstein Company, 438 Riverside Ave., Newark, New Jersey.

When our troops first entered the tropics, moisture saturated ground signal equipment and provided an ideal breeding ground for fungi. These growths, absorbing and holding water like blotting paper, covered parts of equipment and caused short circuits. At the request of the Signal Corps for assistance on this problem, Maas & Waldstein developed a lacquer that is moisture-resistant, has high dielectric strength, and retards the growth of fungi.

The lacquer, marketed as Dulac Fungus-Resistant Lacquer No. 86, may also be used to treat communications equipment before it is assembled and shipped to the tropics. Complying with U. S. Signal Corps Specification No. 71-2202-A, it is a clear, quick-drying lacquer that may be applied by spraying, brushing or dipping.

## Liquid Strainers

Improvements in both design and construction are featured in two types of liquid strainers developed by Spraying Systems Company, 4015-21 W. Lake St., Chicago 24, Illinois.

For installations involving the use of several nozzles on a single feed line, the Type TW is said to offer several advantages. The design of the strainer results in an extremely large open screen area in relation to the pipe area of the line, so that it may easily handle the full capacity of a line supplying several nozzles. Consequently, the TW permits a free flow of the liquid and does not require frequent cleaning. A blowout plug makes the TW easy to


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RIDSMEL

Stops Paint Smell
Before It Starts!

Brush, spray or dip! Paint, varnish, enamel! Regardless of application method or finish, Ridsmel kills paint smell—instantly! Economical, because only a few drops do the trick. Ridsmel does not alter paint quality or characteristics. Used in industrial plants everywhere.

**TEST BOTTLE, $5 prepaid**

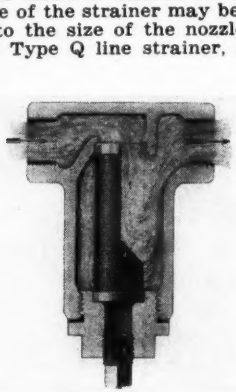
*(Good for 200 Gallons of Paint)*

HOLLEY CHEMICAL CO.
126 E. 25th St., New York 10, N.Y.

flush and clean without removal from the line.

The standard Type TW is supplied with cast iron body and brass wire screen; all brass or all stainless steel construction is also available. A choice of screen mesh is offered so that performance of the strainer may be directly related to the size of the nozzle orifice.

In the Type Q line strainer, a highly



Type TW Liquid Strainer

effective strainer for single nozzle installation is offered. Maximum capacity of this strainer is one gallon per minute of water, brine, oil and liquids of similar viscosity. The screen in this strainer is removable to facilitate cleaning and, like the TW, the Type Q is available in several materials.

## H-VW-M Non-Electric Cleaners

A group of metal cleaners has been made available to metal products manufacturers and electroplaters by the Hanson-Van Winkle-Munning Co., Matawan, N. J. The cleaners have been designated as NL cleaners to distinguish them from others made by the same company. They are not electric cleaners, but are designed for cleaning metals either by soaking or in washing machines.

Each cleaner is prepared in two forms so that it will give the quickest and best results when used in still tanks or in power washers and tumbling barrels.

Aluminum and magnesium cleaners, NL 1915 for still tanks and NL 1915-P for power washers, are used largely as the cleaner before anodizing due to their speed, thoroughness and non-corrosive properties. The NL 1915-S is preferred for removing zinc chromate primer from aluminum.

Cleaners for steel and iron, NL 1916 and NL 1916-P (for power washers) are ferrous metal cleaners, the former for still tanks and the latter for power washers. They are especially designed for cleaning of steel shell cases and are generally useful as soak cleaners for steel.

NL 1918 and NL 1918-P (for power washers) are cleaners for steel prior to various Parkerizing operations. They are low free-alkali cleaners which clean thoroughly and aid in the production of uniform Parker coatings.

Suited for cleaning and brightening brass, including soldered parts, are brass cleaners NL 1917 and NL 1917-P (for power washers. They are used in oblique barrels to produce a bright dip effect, and are said to effect a considerable saving in pickling time.

Cleaners NL 1919 and NL 1919-P (for power washers) are intended for use on brass cartridge cases, stainless steel, tin, and so on. Cleaners NL 1921 and 1921-P are recommended by the manufacturer for cleaning and de-oxidizing copper and aluminum. They are similar to NL 1917 and NL 1917-P except that they produce a better bright finish on copper. They are also used for cleaning and brightening soldered parts.

## "Alronox" Finishing Material

An even black corrosion-resistant finish is said to be obtained on zinc or zinc alloy surfaces when immersed in a solution of the "Alronox" finishing material now being manufactured by The Alrose Chemical Co., Providence, Rhode Island.

No elaborate equipment or controls are required for application, and the material is said to be adaptable to all zinc and die-cast surfaces. It can be applied within a seven-minute cycle. Furthermore, Alronox is said to be non-electrolytic and has a salt spray rating of 200-300 hours on 0.0002-in. zinc plate over steel without after coating.

Alronox is considered an excellent base for organic coatings and has high weather and humidity resistance. In addition, the manufacturer claims that it will not chip or peel and offers maximum reflectivity.

## "Speedairbonds"

The Sterling Varnish Company, 168 Ohio River Blvd., Haysville (suburban Pittsburgh), Pa., announces the "Speed-

airbonds," a group of air-drying, insulating varnishes, designed for use in the manufacture and repair of electrical equipment.

Speedairbonds are said to dry exceptionally fast to a smooth, glossy finish; they are oil-proof and water, acid and alkali-resistant. They also possess high dielectric qualities and flexibility. The manufacturer claims that Speedairbonds are ideal for complete protection and insulation under the most adverse circumstances and against severe atmospheric conditions.

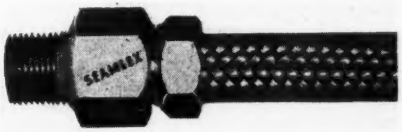
## Pennsalt Solvent Emulsion Cleaner

The Special Chemicals Division of Pennsylvania Salt Manufacturing Company, 1000 Widener Bldg., Philadelphia 7, Pa., has developed a solvent emulsion cleaner which combines soap emulsifying action with solvent penetration. Composed of emulsifying agents and suitable solvents, Pennsalt E. C. No. 10 is of the self-emulsifying non-phenolic type.

Suggested uses for Pennsalt E. C. No. 10 are for the removal of grease, oil, smut, and drawing and buffing compositions from metals and painted surfaces. The undiluted material may be applied cold by dipping, spraying or brushing. It is also applicable to power washer cleaning in water emulsion form. Packed in 55-gallon drums, the cleaner is available in commercial quantities.

## Seamlex "D.T." Fitting

The Seamlex Company, Inc., 27-29 Jackson Ave., Long Island City, N. Y., announces the addition of a ¾-in. I.D. to the line of "D.T." detachable type

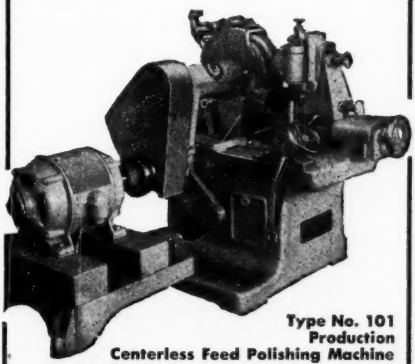



Seamlex "D.T." Fitting

fittings. Seamlex "D.T." fittings consists of only three parts, this simplicity being the key to their efficiency. Seam-


**Automatic Feed Polishing**

Work may be fed through this No. 101 Centerless Feed Polishing machine with inexperiencd labor to obtain the greatest feed speeds. You can get more and better work at lower costs.



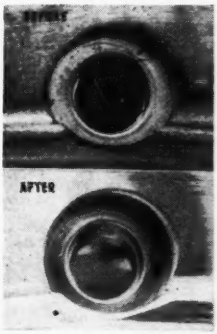
Type No. 101 Production Centerless Feed Polishing Machine

**PRODUCTION MACHINE CO.**

GREENFIELD MASS.



**BRUSH YOUR BURRS AWAY**




Roberts Burring Compound provides better and faster production. NOTE the absence of any excess metal, the smooth finish and rounded corners after brushing shown in lower illustration at right.

*Write for samples and suggestions.*

**ROBERTS ROUGE CO.**

STRATFORD • CONN.

lex "D.T." fittings are said to provide triple safety against leakage due to the metal-to-metal seat, the concentric guide which maintains the tube in correct control alignment, and the automatic stop which prevents stripping the thread and damaging the tube. The fittings are recommended by the manufacturer for use at temperatures above 250 deg. F.

## StaSafe Mask and Acid Hood

Standard Safety Equipment Company, 232 W. Ontario St., Chicago 10, Ill., has introduced the StaSafe mask and acid hood, which completely covers the head and neck and gives adequate protection, from the shoulders up, against a spray, splash or shower of acid. The mask and hood, designated as SD-2129, are made of StaSafe fabric, which is flame proof and resistant to acids, solvents, lacquers, oils, greases and many other solutions which may be injurious to the eyes and skin. It is light in weight.

The mask and hood are mounted on StaSafe headgear which is quickly adjustable to any size; there is adequate room for goggles or glasses. The transparent shield is of special formula acetate and can easily be replaced without the use of tools.

## Acrawax C

Salt spray resistance and moisture-proof qualities of lacquers and varnishes are said to be increased by the addition of small percentages of Acrawax C powdered, a synthetic wax produced by the Glyco Products Co., Inc., 26 Court St., Brooklyn 2, N. Y. It is claimed that Acrawax C does not retard the drying properties of the lacquer or varnish, and the use of Acrawax C also improves the flow-out and helps pigment suspension.

One-half of one per cent Acrawax C powdered, incorporated into a 28 per cent solids urea formaldehyde alkyd modified clear baking varnish, gave a film on a steel panel which, after baking at 300 deg. F. for 30 minutes, resisted a concentrated salt spray (20 per cent) at 100 deg. F. for 144 hours. The Acrawax C powdered should be treated as a pigment and ground into the resin with part of the solvent. The clarity of the varnish is said to be unaffected.

## Chemicals Wanted

The National Registry of Rare Chemicals, Armour Research Foundation, 33rd, Federal and Dearborn Sts., Chicago 16, Ill., has issued a new list of chemicals for which the Registry would like to find sources of supply. These are as follows:

t-Butyl lactate
beta Diethylaminoethyl chloride or bromide
Epicatechin
Hydrocoerulignone (1 or 2 grams)
Hexaphenyl ethane
Indazole
o-Iodosobenzoic acid
Silver fluosilicate
Stannous fluosilicate
Stilbene
Titanium dichloride
Tetra brom ethylene
Trimethyl urea
1, 3, 5 Trichlorobenzene
Trifluorobenzenes, particularly 1, 3, 5

## *New Literature*

**Stevens Buffing Composition Catalog.** Frederic B. Stevens, Inc., Larned and Third Sts., Detroit 26, Mich., has issued Catalog No. 27 which, in addition to describing the various compositions Stevens manufactures, contains numerous articles and charts pertaining to modern materials and methods used in polishing, buffing, deburring and cleaning operations. The book is very comprehensive and will undoubtedly prove of value to metal finishers. Copy free upon request.

BETTER PLATING, LESS COST!
"MGC" ELECTROPLATING EQUIPMENT
Write for Interesting Details TODAY!
MOTOR GENERATOR CORP., HOBART SQ. Box PF-54 TROY, OHIO

**Infra-Red Data** is provided in a well prepared brochure especially planned by Swenson Engineering Service, 2619 Twelfth St., Detroit 16, Mich., for men in industry who must achieve more efficient production. The first portion is devoted to a description of the infra-red ray. Additional sections tell of the evolution of the infra-red oven, infra-red in industry, and the special design of the Swenson oven which employs lamps with internally sealed reflectors. A copy of the booklet may be obtained without charge.

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**Thermo-Electric Glue Heater.** Details on the design and performance of the cabinet type thermo-electric glue heater, product of Divine Brothers Company, Utica 1, N. Y., are given in a special bulletin. A number of different sizes are available with 4, 6, 8, 10 or 12 glue pots, for gas or steam heat. Copy free upon request.

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**Wheel Rakes.** A description of the "Modern" Wheel Rake, a tool for producing the proper buffing face on buffs, is given in a folder issued by The Manderscheid Co., 605 W. Washington St., Chicago 6, Illinois.

Another circular issued by this company gives details about the "Jiffy" Polishing Wheel Weight, a small metal disc with a countersunk nail hole in the center. The purpose of the "Jiffy" is to give a polishing wheel perfect balance. Copies of the folders free upon request.

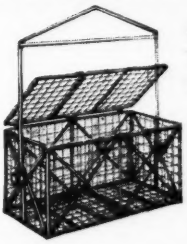
---

**"Air Processing Equipment"** is the title of a catalog released by Peters-Dalton, Inc., 628 E. Forest Ave., Detroit 1, Mich. This 36-page book shows innumerable installations of Peters-Dalton dust collecting units and systems, spray booths and equipment, ovens and ventilating and completely engineered air processing systems. It tells an interesting story of Peters-Dalton complete engineering facilities, and includes detailed specifications of Hydro-Whirl dust collectors and spray booth units, together with engineering data of value to those with air-handling problems.

A copy of this spiral bound catalog will be mailed without charge to plant executives who request it on their company letterhead.


ROLOCK

PROCESSING CARRIERS



CARRY LOADS TO 6000 LBS. EASIER . . . BETTER

Rolock baskets, crates, trays, fixtures, etc., custom-built for the specific job, save time, lower costs. This revolving pickling basket handles 800 lbs. of shell cups, assures complete drainage of solution. All sizes and types to order.

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NEIL HOUSE

DeWITT OPERATED HOTELS

OTHER DeWITT HOTELS

THE LANCASTER Lancaster, Ohio

THE BARON STEUBEN Corning, N.Y.

**N-D Engineering Data.** Newcomb-Detroit Company, 5741 Russell St., Detroit 11, Mich., has issued a catalog completely describing their Uni-Wash dust collectors, spray booths, metal parts washers, ovens and other sheet metal equipment. The catalog is fully illustrated, including cutaway drawings of equipment mechanism and size and capacity charts. The book also includes a 36-page engineering data section containing useful information for engineers working with sheet metal. A catalog will be sent to anyone requesting a copy on his company letterhead.

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**Paint Progress.** The current issue (No. 1, Vol. 5) of "Paint Progress," a publication of The New Jersey Zinc Company, contains several articles of particular interest to those in the metal-finishing industry. "Painting War Machines at Ford" is the story of protecting valuable fighting equipment from rust by the application of a paint primer especially designed for the purpose. Another article gives data on the huge quantities of paint used by the U. S. Navy. A copy of this issue may be obtained by addressing a request to The New Jersey Zinc Company, 160 Front St., New York 7, New York.

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**Fire Extinguishing Systems.** A folder which explains the engineering, performance and outstanding features of Cardox fire extinguishing systems, utilizing low-pressure carbon dioxide, is available from Cardox Corporation, 307 N. Michigan Ave., Chicago 1, Ill. It contains the following information:

(1) How five fire extinguishing requirements are met in a single system. (2) How systems are engineered for the specific hazards covered. (3) How carbon dioxide is given enhanced fire-extinguishing performance. (4) How carbon dioxide is released in mass discharge at high rate of application. (5) How one hazard or many can be protected by a single system. (6) Illustrates various types of hazards and the type of application required for each. (7) Typical performance data under extreme conditions, with photographs. Copy free upon request.

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**Table of Common Hazardous Chemicals.** The National Fire Protective Association has announced the publication of a new and revised seventh edition of its "Table of Common Hazardous Chemicals." This table has been developed by the N. F. P. A. Committee on Hazardous Chemicals and Explosives, in cooperation with the American Chemical Society. It includes data on a number of chemicals not previously in general commercial use which are now widely used in war industry.

Included in the table are data on 98 hazardous chemicals with respect to their fire hazard, life hazard, recommended storage, and proper methods of fire fighting, with recommendations as to suitable extinguishing agents for fires in chemicals which cannot be fought with water by ordinary methods because of chemical reactions with water. The flash point, explosive range and ignition temperatures are given for those chemicals where such information is essential.

Copies of the table may be obtained from the National Fire Protection Association, 60 Batterymarch St., Boston 10, Mass., at the cost of 30 cents a copy.

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**Miskella Hy-Heat Infra-Red Units** are the subject of a bulletin prepared by Infra-Red Engineers & Designers, 1633 E. 40th St., Cleveland, Ohio. Hy-Heat Units are of special design which makes it possible to place them very close to the product to be heated. Hy-Heat Units may be suspended horizontally, used singly, end to end, or in any angular arrangement. Copy of the bulletin free upon request.

---

**Geon Resins and Plastics.** Description of the unique group of polyvinyl resins and plastics which it has recently developed and offered for distribution to industrial users under the grade name "Geon" is contained in an attractive four-page folder issued by the Chemical Division of The B. F. Goodrich Company, Akron, Ohio, and available upon request.

One page is devoted to an outline of the characteristics of the four Geon resins. Two are special polymers of vinyl chloride marked for their thermal and light stability, toughness and general inertness. The others are vinyl chloride: vinylidene chloride co-polymers which combine increased solubility and thermoplasticity with exceptional stability, chemical resistance and wide useful temperature range. A properties table for each is included.

Geon plastics are the subject of another page, with the range of characteristics described. The plastics are furnish-

ed in ready-to-use compositions, either of standard compounds or tailor-made formulations, in either sheet form or granules. One page is devoted to a partial lists of the Geon resins and plastics applications, including electrical service, extruded products, gaskets and packing, as protective coatings, for coated fabrics and papers and calendered and cast sheets and films.

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**Standard Pickling Control.** The American Chemical Paint Co. has recently published an illustrated technical service data folder on Rodine, a standard control for the pickling bath. The folder explains what Rodine is and what it does, and points out advantages for the user. For a copy of the folder, write to American Chemical Paint Co., Ambler, Pennsylvania.

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**"Hisey" Electric Grinders and Buffers** are the subject of a 36-page catalog released by The Hisey-Wolf Machine Co., Cincinnati, Ohio. Designated as the No. 70, the catalog features illustrated, descriptive and tabular information on bench and floor grinders; heavy duty bench and floor grinders; extra heavy duty floor grinders; 5, 7½ and 10 h.p. heavy duty floor grinders; combination wet and dry grinders; combination and double end disc grinders; bench type drill grinders; heavy duty drill grinders; heavy duty wet drill grinders; buffers and polishers; Tex-Drive grinders; Tex-Drive disc and combination grinders; heavy duty Tex-Drive snagging grinders; Tex-Drive wet grinders; Tex-Drive combination wet and dry grinders; Tex-Drive buffing and polishing machines; heavy duty Tex-Drive buffers and polishers; infinitely variable speed buffing and polishing machines; tool post grinders; angle plate grinders; vertical spindle grinders, and wide range precision grinders.

Attachments and accessories for "Hisey" grinders and buffers are also shown and briefly described. Copy of Catalog No. 70 free upon request.

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**Hard Rubber Products.** Distinctive qualities of hard rubber which make it unique as an engineering material among all the various plastics now used by industry are listed in the catalog section on hard rubber products, No. 9405, issued by The B. F. Goodrich Company, Akron, Ohio. Copy available upon request.


**SOL-KLEAN**
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Better Paint
Adhesion
INDUSTRIAL CHEMICAL PRODUCTS CO.
DETROIT 7
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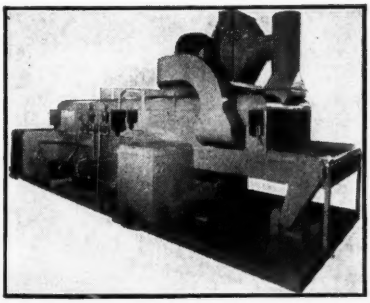
SPECIALISTS IN
Acid and Oil Proof
INDUSTRIAL
Write for Descriptive Literature
GLOVES
Edmont Manufacturing Co.
509 Orange St. Coshocton, Ohio


HYDRO-FLOW
INDUSTRIAL WASHING MACHINES
Streamlined design. Recirculating hot or cold air blow off. Hidden motors, pumps and pipes are easily accessible. Piping and nozzles located to insure thorough cleansing of all surfaces. Rugged and efficient pressure pump. Corrosion resistant spray nozzles—from mist to open stream. Handling alkali to varsol as cleaner. Monorail, Belt, or Gravity type conveyors designed to carry any shape or size material. Variable speeds on conveyor drive synchronize production.
INTERNATIONAL CONVEYOR & WASHER CORP.
*Write for circular.*
652 E. FORT ST. DETROIT, MICH.

**Dust Engineering.** No. 2, Vol. 5 (for the first quarter of 1944) of "Dust Engineering" has been published by American Air Filter Company, Inc., 215 Central Ave., Louisville 8, Ky. Included in this issue are illustrated articles on the Type N Roto-Clone, in which water is made to run uphill; a discussion of how dust control speeds production; ventilated benches and booths; airplane engine filters, and other interesting subjects. A copy of "Dust Engineering" may be obtained by addressing a request to American Air Filter Company at the address given above.

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**Westinghouse "Lighting Handbook."** Due to the demand for information on wartime lighting, Westinghouse Lamp Division, Bloomfield, N. J., has issued a 175-page "Lighting Handbook," originally scheduled for release after the war.

Designed as a practical guide and reference work for lighting engineers, designers, architects and builders, the book features a series of charts which coordinate room index, fixture efficiency and coefficient of utilization curves and provide a new and graphic method of determining the desired illumination for various applications. Charts cover industrial and commercial fluorescent and incandescent lighting and provide a means for quickly calculating the number and size of lamps needed with practically every type of lighting fixture.

The book is divided into two parts, chapter headings in the first section being as follows: Lighting Terms and Measurements; Recommended Levels of Illumination; Interior Lighting Design Calculations, and Interior Wiring for Lighting. In the second half of the book, which is devoted to specific lighting applications, are chapters covering office, school, public building, industrial, architectural, aviation, and street and highway lighting.

Copies of the "Lighting Handbook," which is case-bound with a leatherette cover, are available at a price of $1.00 each from district offices of Westinghouse.

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**Thermocouple Data Book.** Wheelco Instruments Company, Harrison and Peoria Sts., Chicago 7, Ill., has announced a new edition of its Wheelco Thermocouple Data Book and Catalog, Bulletin S2-4. Containing 36 pages, the catalog gives a description of products, prices and recommendations for thermocouple users, and suggests substitutes for restricted materials. It carries the latest amendment to the WPB's Conservation Order L-135, and gives data on selection of thermocouples, lead wire, protecting tubes, heads and insulators. Also carried are temperature conversion tables, millivolt tables, and tables on pipe and wire sizes, decimal equivalents and wire resistances. Instructions are given on checking thermocouples and pyrometers, and on construction of thermocouples. Copy free upon request.

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## *Opportunity Section*

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**SERVICE LABORATORY CHEMIST**

with experience in solving metal cleaning problems and ability to handle customer correspondence. Expanding department of well established chemical company. Permanent position with a postwar future. Please give complete details in your reply. Box 59, PRODUCTS FINISHING, 431 Main St., Cincinnati 2, Ohio.

**WANTED**

**CHEMICAL SALES ENGINEER**

By well established small company in Michigan experienced in industrial metal cleaning and general cleaning compounds. One with following preferred, but not absolutely necessary. Good personality essential. Have excellent opportunity for right party. Bulk of our business is with automotive industries and post war possibilities are excellent. Give all particulars and enclose snapshot if possible. All replies strictly confidential. Write Box 56, PRODUCTS FINISHING, 431 Main Street, Cincinnati 2, Ohio.

**"Here's How for General Wirebound Boxes."** Instruction charts, designed to save time in the shipping room, are now being distributed by the General Box Company, Chicago, Ill. These service charts are clearly written and packed full of instructive photographs. In an attractive portfolio, they show the simple steps necessary to assemble and close all types of General Wirebound boxes and crates.

The portfolio should be a valuable assistant in any shipping room; it is especially helpful for newcomers in the shipping room. Copy of the portfolio of charts free upon request.

# Opportunity Section


## CHEMIST WANTED

To assist in formulating lacquers and synthetic enamels for automotive trade. State age, military status, experience, salary.

**AUTOMOTIVE FINISHES, INC.**
P. O. Box 457, N. W. Station
DETROIT 4 • MICHIGAN

## Representatives and Distributors Wanted

A nationally known manufacturer of metal cleaning machinery, solvents, and metal cleaning compounds, has open territory. Desires alert, aggressive representation. Direct mail and trade paper advertising assures excellent opportunity now and post war . . . Write, stating territory covered, background and present connections. Box 53, Products Finishing, 431 Main St., Cincinnati 2, Ohio.

## TECHNICAL SERVICE LABORATORY OPPORTUNITY:

Interesting, creative, and remunerative position essential to war effort for chemist or chemical engineer having knowledge of cleaning, plating, and finishing metals. Permanent position with large chemical manufacturer. Good academic training essential with some industrial experience desirable. Opportunity for association with a research minded organization, in professional environment and pleasant surroundings. Write Box 54, Products Finishing, 431 Main St., Cin'ti 2, Ohio.

## Industrial Salesmen Wanted

Excellent opportunity for experienced salesmen with good following and broad contacts. Chicago area particularly desired. Our plants being centrally located, we are able to make deliveries to Midwestern concerns within forty-eight hours. A complete line of high grade Industrial Finishes together with the high integrity of our firm and splendid research backing would assure salesmen of success. Direct your reply with full details to Box No. 52, PRODUCTS FINISHING, 431 Main Street, Cincinnati 2, Ohio.

## PLATING FOREMAN

We are looking for a man who will be able to take charge of the plating, painting and finishing department in one of our Pennsylvania plants manufacturing electronic equipment.

Sound technical knowledge of electroplating, chemistry, and allied fields very helpful, but good practical experience in copper, nickel, gold, zinc, chromium, and rhodium plating more important.

Must be able to get along well with people and be able to plan and organize his work efficiently.

Reply giving age, education, experience, and salary desired to start. Early and convenient interviews will be arranged for qualified applicants. Write Box 58, Products Finishing, 431 Main St., Cin'ti 2, Ohio.

*The Finishing Touch* — **J. A. Patterson**

***"I don't give a hoot if he never bathes — you're not going to do that!"***